

EXHIBIT 26

PC98204

■ **KITCHEN KNIGHT™:
RESTAURANT
FIRE SUPPRESSION
SYSTEM –
PCL-240/350/550**



TECHNICAL MANUAL

- **COMPONENTS**
- **DESIGN**
- **INSTALLATION**
- **MAINTENANCE**

TABLE OF CONTENTS

Page	Subject	Revision	Date	Page	Subject	Revision	Date
General Information				System Design (Continued)			
1-1	Introduction	2	5/1/97	3-8	Cylinder Sizing	2	10/1/97
Components				Piping Limitations			
2-1	Cylinders & Valves	2	6/1/94	3-9	Main Supply Line Piping	2	10/1/97
2-2	Valve Rebuilding Equipment	2	6/1/94		Branch Line Piping		
	Cylinder Bracketing				Understanding Equivalent Piping		
	Extinguishing Agent				Main Supply Line Piping Limitations		
	MCH Control Head				PCL-240 Main Supply Limits		
	ECH Control Head				PCL-350 Main Supply Limits		
	NMCH Control Head				PCL-550 Main Supply Limits		
2-3	EN-MCU Enclosure	2	4/1/95	3-10	Branch Piping Limitations	2	10/1/97
	EN-S Enclosure				...One Nozzle Duct Branch		
	MB-P2 Mounting Bracket				...Two Nozzle Duct Branch		
	PAC-10				...One Nozzle Plenum Branch		
	PAC-200				...One Nozzle Appliance Branch		
2-4	Detection Equipment	2	4/1/95	3-11	...Two Nozzle Appliance Branch	2	10/1/97
	...FLK-1				...Three Nozzle Appliance Branch		
	...FLK-1A				...Four Nozzle Range Branch		
	...FLH-1			3-12	Typical Piping Layout	2	10/1/97
2-5	Fusible Links	2	1/1/98	3-13	Detector Placement	1	11/1/94
	Thermal Detectors				...Exhaust Ducts		
	RPS-M Remote Pull Station				...Cooking Appliances		
	Gas Shut Off Valves			3-14	Blank		10/15/98
	GVSO Shut Off Valves			System Installation			
2-6	EGVSO Gas Shut Off Valves	1	11/1/94	4-1	General	2	1/1/98
	Corner Pulleys				Cylinder Installation		
	MCP-1 Corner Pulleys				Control Head Installation		
	CP-1 Corner Pulleys				Single Cylinder Introduction		
2-7	Tee Pulley	4	11/1/95	4-2	Multiple Cylinder Installation	1	11/1/94
	Electric Switches			4-3	Multiple Cylinder Installation (cont.)	1	11/1/94
	MS-SPDT Micro Switch			4-4	Fusible Link Detector Installation	1	11/1/94
	MS-DPDT Micro Switch				Fusible Links Without Hangers		
	SM-120/24 Solenoid Monitor			4-5	Fusible Links With Link Hangers	1	11/1/94
2-8	Pipe and Fittings	4	11/1/95	4-6	Thermal Detector Installation	1	11/1/94
	Nozzles				Setting The Control Head		
	Straight Nozzles				MCH Control Head		
	Swivel Nozzles				ECH Control Head		
2-9	Components List	5	10/15/98	4-7	Solenoid Monitor Installation	1	11/1/94
System Design					In A Detection Circuit		
3-1	Nozzle Coverage and Placement	1	11/1/94	4-8	Solenoid Monitor When Used As	2	1/1/98
	Duct Protection				A Reset Relay		
	...NL-P			4-9	Remote Pull Station Installation	2	1/1/98
	...NL-D2				Gas Shut Off Valve Installation		
	...NL-D3				Mechanical Gas Shut Off		
3-2	Plenum Protection	1	11/1/94		Valve Installation		
3-3	Appliance Protection	1	11/1/94	4-10	Electrical Gas Shut Off Valve	1	11/1/94
	...Range Coverage				Installation		
3-4	...Griddle Coverage	1	11/1/94	4-11	Tee Pulley Installation	1	11/1/94
	...Deep Fat Fryer Coverage				Miniature Switch Installation		
3-4a	...Deep Fat Fryer Coverage	4	1/1/98	4-12	Pipe and Nozzle Installation	1	11/1/94
3-4b	...Range Coverage	4	1/1/98	4-13	System Checkout After Installation	1	11/1/94
3-4c	...Modular Deep Fat Fryer Coverage	2	1/1/98		Installation (cont.)		
3-4d	...Modular Deep Fat Fryer Coverage	2	1/1/98	4-14	Blank	1	10/15/98
3-4e	...Griddle Coverage – Low Proximity	1	11/1/97	Enclosure Installation			
3-4f	Blank		1/1/98	4-15	Enclosure Mounting	1	4/1/95
3-5	...Radiant Charbroiler Coverage	1	11/1/94		Fusible Link Detector Installation		
	...Synthetic Rock Charbroiler Coverage			4-16	Setting the EN-MCU	1	4/1/95
	...Natural Class "A" Charbroiler Coverage				Remote Pull Station Installation		
3-6	...Upright Broiler Coverage	1	5/1/97	4-17	Gas Shut-off Valve Installation	1	4/1/95
	...Chain Broiler Coverage			4-18	Miniature Switch Installation	1	4/1/95
3-6a	...Tilting Skillet/Braising Pan Coverage	1	5/1/97		Cylinder Installation		
3-6b	...Electrostatic Precipitator Protection	1	5/1/97		Single Cylinder Installation		
3-7	...Open Top Chain Broiler Coverage	1	11/1/94	4-19	Multiple Cylinder Installation	1	4/1/95
	...Wok Coverage			4-20	System Checkout After Installation	1	4/1/95

TABLE OF CONTENTS

<u>Page</u>	<u>Subject</u>	<u>Revision</u>	<u>Date</u>	<u>Page</u>	<u>Subject</u>	<u>Revision</u>	<u>Date</u>
	<u>System Maintenance</u>						
5-1	General	1	11/1/94				
	Maintenance After Discharge						
	...Cleanup After Discharge						
	...Recharge After Discharge						
5-2	Piping and Nozzles	1	11/1/94				
	...System Reset						
	Regular System Maintenance						
	...6 Month Maintenance						
	...Annual Maintenance						
	...Hydrostatic Testing						

CHAPTER I GENERAL INFORMATION

INTRODUCTION

The Pyro-Chem Restaurant Fire Suppression System is of the pre-engineered type as defined by NFPA-17A Standard for Wet Chemical Extinguishing Systems and is designed to provide fire protection for restaurant cooking appliances, hoods, and ducts. Installation and maintenance of the system must conform to the limitations detailed in this manual and be performed by an Authorized Pyro-Chem dealer.

The Pyro-Chem System utilizes a wet chemical agent specifically designed to suppress restaurant cooking area fires. The system provides automatic actuation and can be manually actuated through a remote mechanical pull station. Upon actuation, the system discharges a pre-determined amount of agent to the duct, plenum, and cooking appliances. The agent acts to suppress fires in three ways:

1. The chemical chain reaction causing combustion is interrupted by both the agent itself and the resulting steam formation.
2. The agent cools the fire bringing it below auto-ignition temperature.
3. The agent reacts with hot grease forming a soap-like layer (saponification) that helps prevent the escape of combustible vapors, thus preventing re-ignition.

The shutdown of fuel and power to all appliances under protected ventilation equipment is required upon system actuation. The shutdown of make-up or supply air is recommended upon system actuation but is not required. Exhaust fan(s) in the ventilation system should remain on during system discharge as they assist the dispersion of chemical through the ventilating system. The system is UL Listed with or without exhaust fan shutdown.

TEMPERATURE LIMITATIONS

The operating temperature range of the Pyro-Chem System is 32° F. (0° C.) minimum to 120° F. (49° C.) maximum.

UL LISTING

The Pyro-Chem Restaurant Fire Suppression System has been tested to the UL Standard for Fire Extinguishing Systems For Protection of Restaurant Cooking Areas, UL300 and Listed by Underwriters Laboratories, Inc. System agent cylinders bearing the Underwriters Laboratories of Canada, Inc. ULC mark also meet Underwriters Laboratories of Canada's Standard ULC/ORD-C1254.6-1995.

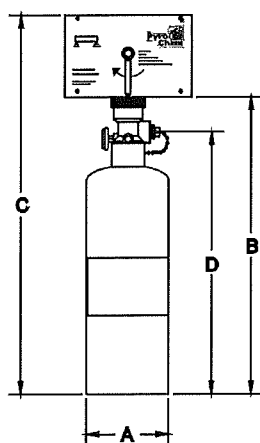
Note:

Components with like Model Numbers bearing the Wells Fargo Pyro Technologies Inc. name can be used as direct replacements for components bearing the Pyro-Chem name.

CHAPTER II COMPONENTS

CYLINDERS & VALVE

The Pyro-Chem System has available three different size cylinders: the Models PCL-240, PCL-350, and PCL-550. Cylinder sizes are expressed in terms of extinguishing agent capacity (i.e., the PCL-240 uses 2.4 gallons of extinguishing agent). The cylinder is manufactured, tested, and marked in accordance with DOT 4B175. Cylinders come pre-filled with extinguishing agent and are charged with dry nitrogen to a pressure of 175 psig @ 70° F. Cylinder and valve assembly dimensions are shown in **Figure 2-1**.



Model No.	A	B	C	D	Flow Point Capacity	Weight	Mounting Bracket Used
PCI-240	8.00	24.13	30.13	21.75	8	55 lbs.	MB-15
PCI-350	10.00	24.75	30.75	22.38	13	85 lbs.	MB-15
PCI-550	10.00	34.50	40.50	32.13	20	110 lbs.	MB-1

Figure 2-1. Cylinder and Valve Assemblies.

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All cylinders utilize the same valve assembly (P/N 490-420720). It is a pressure sealed poppet type valve designed to provide rapid actuation and discharge of agent. See **Figure 2-2**.

Item	Part Number	Description
1		Valve Body
2	490-420761	Cap & Stem Asmbly.
3	385-420705	Conical Spring
4	490-020719	Piston
5	325-420716	Neck O-Ring
6	732-420713	Pressure Gage
7	325-020028	Stem O-Ring
8	741-420802	Valve Cap
9	711-620386	Shrader Valve
10	325-420714	Valve Cap O-Ring
11	325-420715	Piston O-Ring

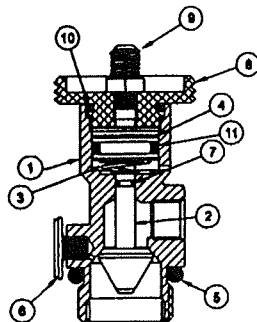


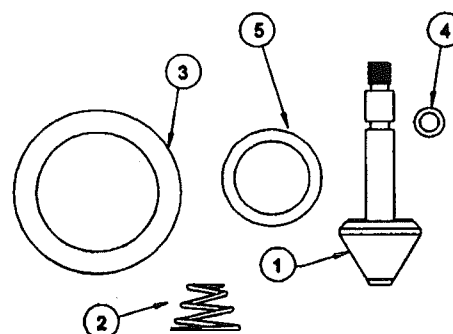
Figure 2-2. Valve Cross Section.

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VALVE REBUILDING EQUIPMENT

1. Wet Valve Seal Rebuilding Kit (P/N 490-420698).

After system discharge, the valve assembly must be carefully inspected to ensure no mechanical damage has occurred. If rebuilding is necessary, the Wet Valve Seal Rebuilding Kit (P/N 490-420698) should be used. It includes all system components necessary to properly rebuild the valve. See **Figure 2-3**.



Item	Part Number	Description
1	490-420761	CAP & STEM ASSY.
2	385-420705	CONICAL SPRING
3	325-420716	NECK O-RING
4	325-020028	STEM O-RING
5	325-420715	PISTON O-RING

Figure 2-3. Wet Valve Seal Rebuilding Kit (P/N 490-420698).

002906PC

2. Model VT-1.

The Model VT-1 wet valve tool is designed to facilitate the rebuilding of the wet valve assembly. It should be used to hold the wet valve piston while unscrewing the cap and stem assembly. See **Figure 2-3.1**.

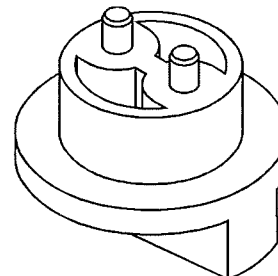


Figure 2-3.1. Model VT-1 Wet Valve Tool.

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CYLINDER BRACKETING

Vertical bracketing of the PCL-240 and PCL-350 is provided by the Model MB-15 bracket kit. Vertical bracketing of the PCL-550 is provided by the Model MB-1 bracket kit. These kits must be ordered separately with each cylinder/valve assembly. Cylinder installation instructions are provided in the installation section of this manual.

EXTINGUISHING AGENT

The agent used in Pyro-Chem Systems is a potassium carbonate based solution that is extremely effective for all types of kitchen fires. This agent is available for cylinder recharging in three size containers: 2.4 gallon (Model RL-240), 2.75 gallon (Model RL-275), and 3.5 gallon (Model RL-350). The agent is shipped in plastic containers. The RL-240 and RL-350 provide one complete tank charge for the PCL-240 and PCL-350 respectively. The PCL-550 requires two (2) RL-275 charges.

CAUTION

Precautions must be taken when handling and transferring wet agents as they are caustic in nature. Goggles must be worn at all times. If any agent gets into the eyes, they should be flushed with clean water for 15 minutes and a physician contacted. If any agent contacts the skin, it should be flushed with cold water to prevent irritation. The agent is electrically conductive. Care must be taken to thoroughly clean up any agent discharged around electrical appliances before turning the power on.

After system discharge, agent must be cleaned up immediately with hot, soapy water to prevent corrosion of effected surfaces.

MODEL MCH - MECHANICAL CONTROL HEAD

The Model MCH mechanical control head is a fully mechanical control head which can be connected to the PCL-240/350/550 cylinder valve. This control head will support a fusible link detection system, a remote mechanical pull station (Model RPS-M), and a mechanical or electric gas shut-off valve. A miniature electric switch (Model MS-SPDT or MS-DPDT) can be ordered separately and field installed. It is equipped with a local manual control handle that allows for mechanical system actuation. Operation of the local manual control requires removing the pull pin and rotating the handle clockwise. The Model MCH control head can actuate a maximum of three (3) cylinders. See **Figure 2-4**.

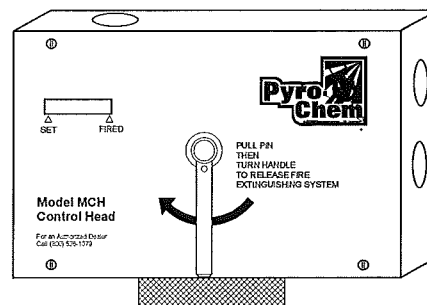


Figure 2-4. Mechanical Control Head.

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MODEL ECH – ELECTRIC CONTROL HEAD

The Model ECH electric control head is an electrically operated control head which can be connected to the PCL-240/350/550 cylinder valve. This control head will support an electric thermal detection system, a remote mechanical pull station (Model RPS-M), and a mechanical or electric gas shutoff valve. It will not support a fusible link detection system. A miniature electric switch (Model MS-SPDT) is included. The Model ECH control head is available in both 120 VAC (Model ECH-120) and 24 VDC (Model ECH-24). It is equipped with a local manual control handle that allows for mechanical system actuation. Operation of the local manual control requires removing the pull pin and rotating the handle clockwise. The Model ECH control head can actuate a maximum of three (3) cylinders. See **Figure 2-5**.

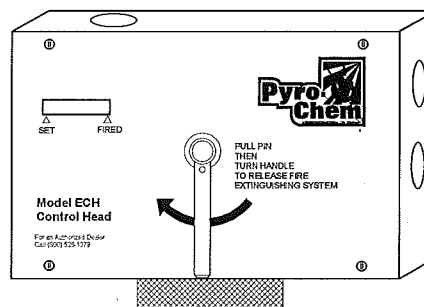


Figure 2-5. Electric Control Head.

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MODEL NMCH - MECHANICAL CONTROL HEAD

The Model NMCH Mechanical Control Head is a fully mechanical control head which can be connected to the PCL-240/350/550 cylinder valve. This control head will support a fusible link detection system, a remote mechanical pull station (Model RPS-M), and a mechanical or electric shut-off valve. A miniature electrical switch (Model MS-SPDT or MS-DPDT) can be ordered separately and field installed. There is no local manual actuation for the Model NMCH. The Model NMCH control head can actuate a maximum of three (3) cylinders. **The Model NMCH can be used as a direct replacement for the Model MCH.**

MODEL EN-MCU ENCLOSURE

The Model EN-MCU Enclosure is used for vertical mounting of a single PCL-240 or PCL-350. The EN-MCU also includes a mechanical control unit, eliminating the need for a Model MCH Control Head. See **Figure 2-5.1**. The PCL-550 cannot be mounted in an EN-MCU.

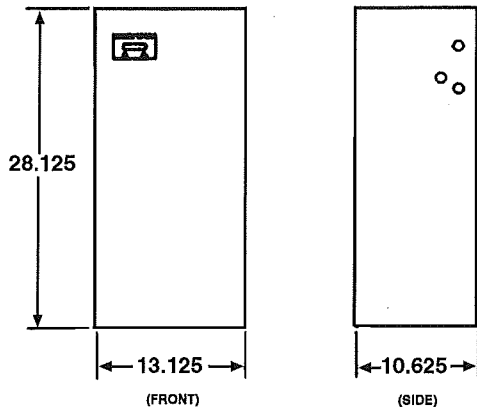


Figure 2-5.1. Model EN-MCU Enclosure.

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MODEL EN-S ENCLOSURE

The Model EN-S Enclosure is used for vertical mounting of a single PCL-240 or PCL-350 when it is used as a secondary agent cylinder in a system. The EN-S has no control mechanism, and must be used in conjunction with a Model EN-MCU Enclosure or a Model MCH/ECH Control Head. The PCL-550 cannot be mounted in an EN-S.

MODEL MB-P2 – CONTROL HEAD MOUNTING BRACKET

The Model MB-P2 mounting bracket must be used to mount the Model ECH control head if the control head is not mounted directly on a cylinder valve. See **Figure 2-6**.

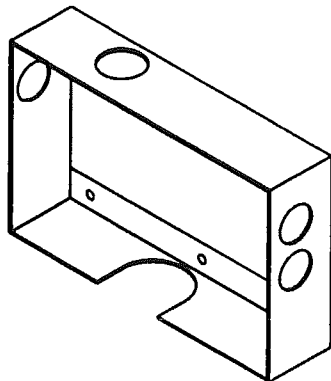


Figure 2-6. Model MB-P2 - Control Head Mounting Bracket.

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PNEUMATIC ACTUATING CYLINDERS

1. Model PAC-10.

The Model PAC-10 is a pneumatic actuating cylinder that can actuate a maximum of ten (10) agent cylinders simultaneously. The Model PAC-10 includes a DOT 4B350 cylinder pressurized with dry nitrogen to 350 PSIG @ 70° F., a brass valve with pressure gauge, and a wall mounting bracket. A Model MCH or ECH control head must be purchased separately and connected to the PAC-10 to open the valve. See **Figure 2-7**.

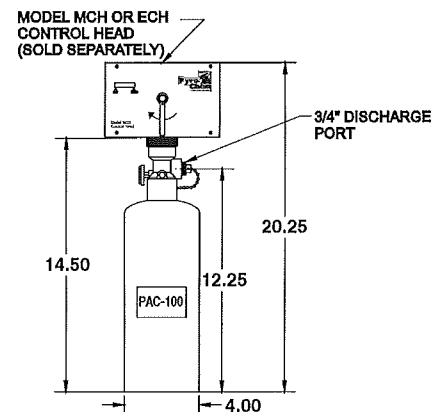


Figure 2.7. Model PAC-10 Pneumatic Actuating Cylinder.

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2. Model PAC-200.

The Model PAC-200 is a pneumatic actuating cylinder that can actuate a maximum of twenty (20) agent cylinders simultaneously. The Model PAC-200 includes a DOT 4B350 cylinder pressurized with dry nitrogen to 350 PSIG @ 70° F., a brass valve with pressure gauge, and a wall mounting bracket. A Model MCH or ECH control head must be purchased separately and connected to the PAC-200 to open the valve. See **Figure 2-8**.

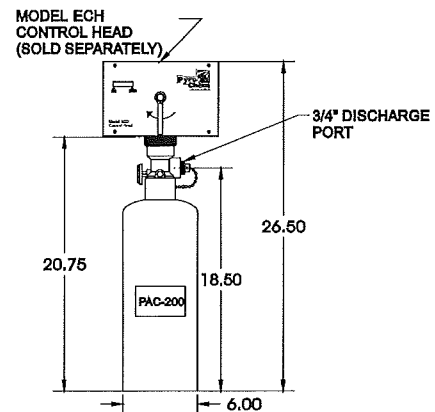


Figure 2-8. Model PAC-200 Pneumatic Actuating Cylinder.

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DETECTION EQUIPMENT

1. Model FLK-1.

The Model FLK-1 fusible link kit includes a 10" steel bracket, two (2) 1/2" EMT connectors, four (4) cable crimps, and two (2) "S" hooks. Fusible links must be ordered separately. See **Figure 2-9**.

2. Model FLK-1A.

The Model FLK-1A fusible link kit includes an 8" steel bracket, two (2) 1/2" EMT connectors, four (4) cable crimps, and two (2) "S" hooks. Fusible links must be ordered separately.

3. Model FLH-1.

The Model FLH-1 fusible link hanger is an accessory designed to simplify the installation of fusible links in the fusible link line. It can be used with the Model FLK-1/1A fusible link kit (kits must be ordered separately). The Fusible Link Hanger makes it possible to install fusible links without cutting and crimping loops in the fusible link line for each link. They are available in packages of 25 (FLH-25) only. See **Figure 2-10**.

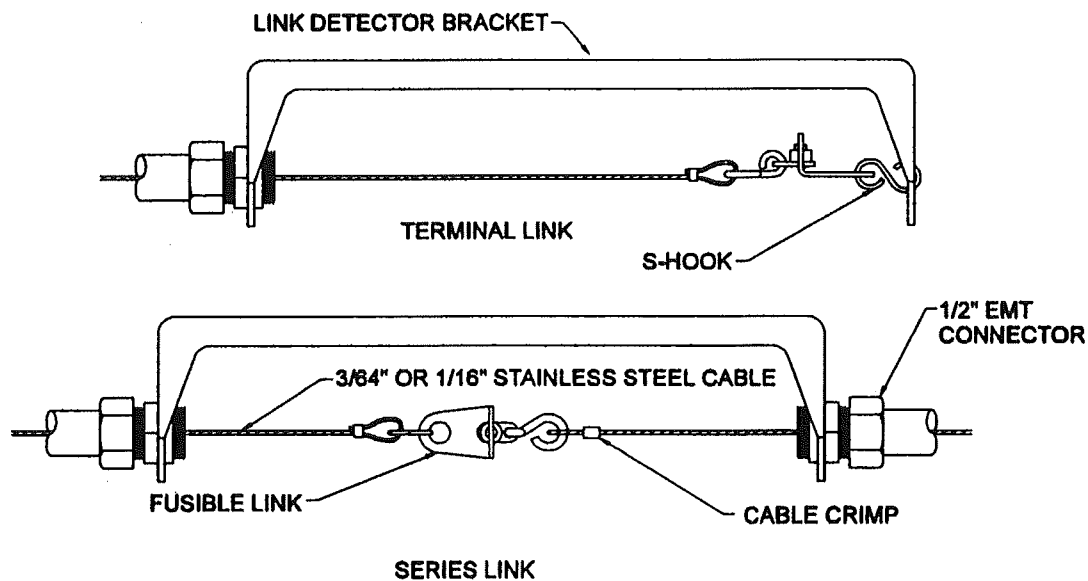


Figure 2-9. Model FLK-1 Fusible Link

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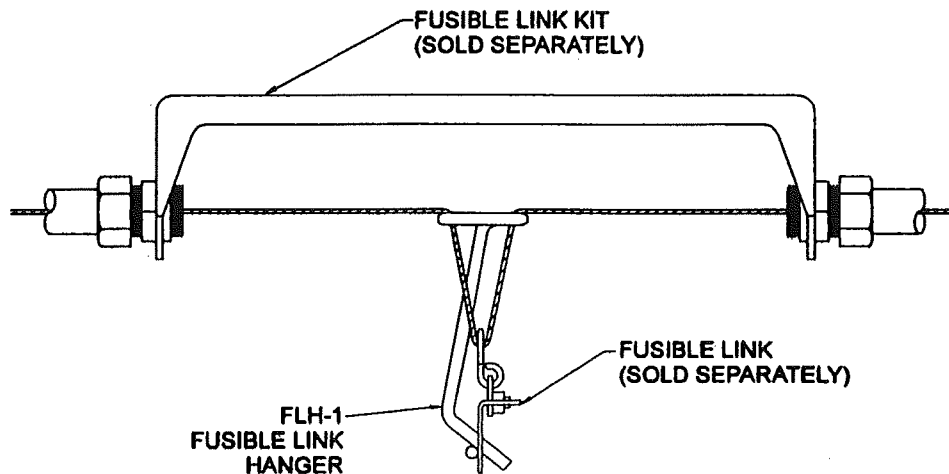


Figure 2-10. Model FLH-1 Fusible Link Hanger

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4. Fusible Links.

The fusible link is designed to separate at a specific temperature, releasing tension from the fusible link line, causing system actuation. See **Figure 2-11**.

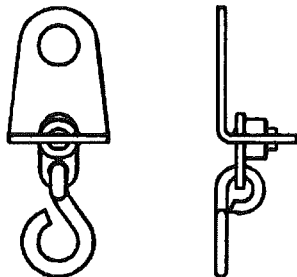


Figure 2-11. ML Style Fusible Link.

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After determining the maximum ambient temperature at the fusible link location, select the correct fusible link according to the temperature condition chart below:

Fusible Link Model No.	Maximum Ambient Temperature
FL-165	95° F. (35° C.)
FL-212	142° F. (61° C.)
FL-280	210° F. (99° C.)
FL-360	290° F. (143° C.)
FL-450	380° F. (193° C.)
FL-500	430° F. (221° C.)

5. Thermal Detectors.

Fixed temperature thermal detectors are normally open, mechanical contact closure switches designed to operate at a factory preset temperature. They are available in six preset temperatures which meet NFPA standards and are UL Listed and FM Approved. After determining the maximum ambient temperature at the thermal detector location, select the correct thermal detector according to the temperature condition chart below:

Thermal Detector Model No.	Maximum Ambient Temperature
TD-140	70° F. (21° C.)
TD-190	120° F. (49° C.)
TD-225	155° F. (68° C.)
TD-325	255° F. (124° C.)
TD-450	380° F. (193° C.)
TD-600	530° F. (277° C.)

MODEL RPS-M - REMOTE MECHANICAL PULL STATION

Remote manual control for the Model MCH or ECH control head is provided by the Model RPS-M remote mechanical pull station. It is connected to the system control head by

stainless steel cable. This cable is enclosed in 1/2" EMT with corner pulleys at each change in direction. The remote mechanical pull station shall be located at the point of egress. See **Figure 2-12**.

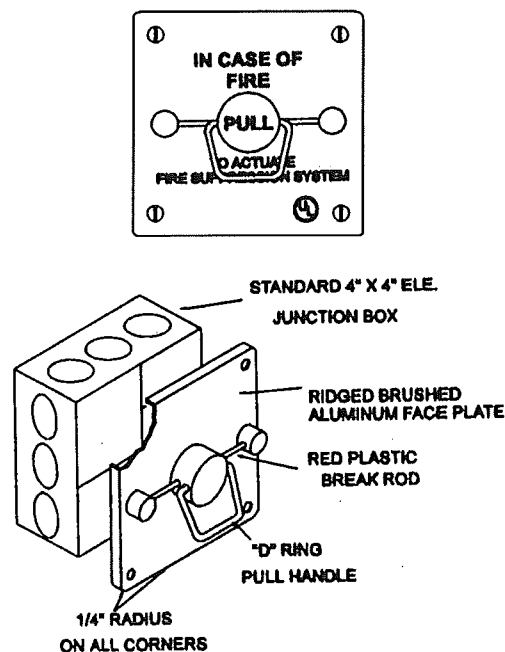


Figure 2-12. Model RPS-M Mechanical Pull Station.

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GAS SHUTOFF VALVES

1. Mechanical Gas Shutoff Valve.

A gas shutoff valve is required on all systems used to protect a gas fueled cooking appliance to stop gas flow in the event of system actuation. A mechanical gas valve can be used with either the Model MCH or ECH control head. It is connected to the system control head by stainless steel cable. This cable is enclosed in 1/2" EMT with a corner pulley at each change in direction. The valves are rated for natural and LP gas (see **Figure 2-13**). Mechanical gas valves are available in the following sizes:

Model No.	Valve Size	Maximum Operating Pressure
GVSO-75	3/4"	5 psi
GVSO-100	1"	5 psi
GVSO-125	1-1/4"	5 psi
GVSO-150	1-1/2"	5 psi
GVSO-200	2"	5 psi
GVSO-250	2-1/2"	5 psi
GVSO-300	3"	5 psi

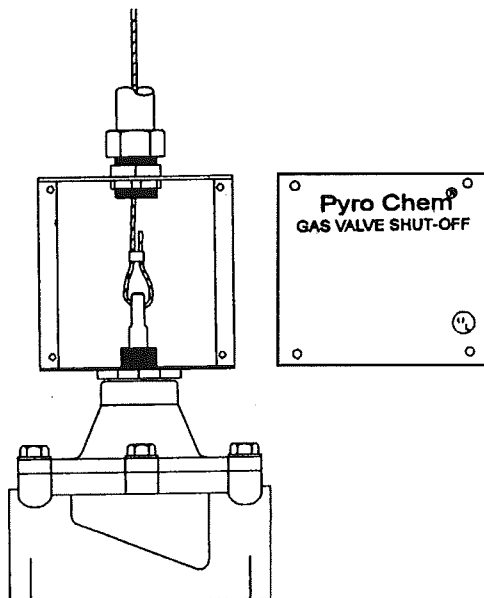


Figure 2-13. GVSO-Series Mechanical Gas Valve.
 002853PC

2. Electric Gas Shutoff Valve.

A gas shutoff valve is required on all systems used to protect a gas fueled cooking appliance to stop gas flow in the event of system actuation. A UL Listed electric gas valve can be used with either the Model MCH or ECH control head. The valves are rated for natural and LP gas. Valves are available in 120 VAC. Electric gas valves are available in the following sizes:

Model No.	Valve Size	Maximum Operating Pressure
EGVSO-75	3/4"	50 psi
EGVSO-100	1"	25 psi
EGVSO-125	1-1/4"	25 psi
EGVSO-150	1-1/2"	25 psi
EGVSO-200	2"	25 psi
EGVSO-250	2-1/2"	25 psi
EGVSO-300	3"	25 psi

Note: A UL Listed manual reset relay is required when using an electric gas valve. The Pyro-Chem Model SM-120 solenoid monitor may be used for this purpose.

CORNER PULLEYS

1. Model MCP-1.

A corner pulley is used whenever a change in stainless steel cable direction is required. The Model MCP-1 corner pulley is equipped with a set screw fitting for connection to 1/2" EMT. See Figure 2-14.

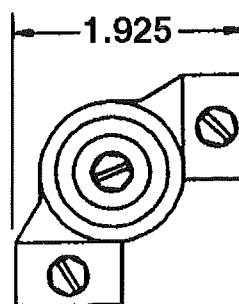


Figure 2-14. Model MCP-1 Corner Pulley.
 002854PC

2. Model CP-1.

A corner pulley is used whenever a change in stainless cable direction is required. The Model CP-1 is a grease-tight corner pulley designed for areas likely to experience excessive deposit build-up. It is equipped with a compression fitting for connection to 1/2" EMT. See Figure 2-15.

Note: The Model CP-1 is not a liquid tight seal for penetration of hoods and/or ducts.

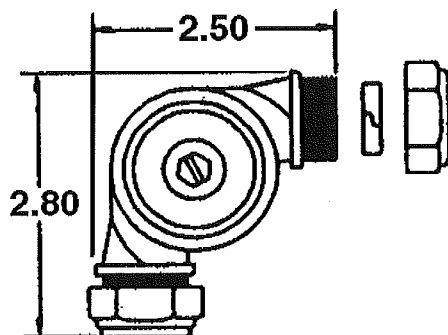


Figure 2-15. Model CP-1 Corner Pulley.
 002855PC

TEE PULLEY

The Model TP-1 tee pulley is used to connect two mechanical gas valves or two remote mechanical pull stations to a single control head. The tee pulley replaces two standard 90o corner pulleys. See **Figure 2-16**.

CAUTION

The Tee Pulley must never be used to connect multiple fusible link lines to a single control head.

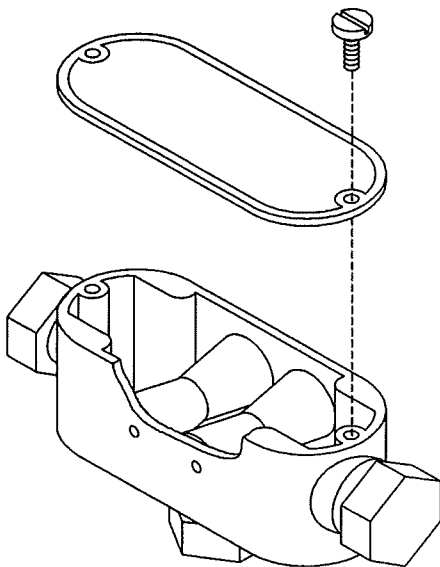


Figure 2-16. Model TP-1 Tee Pulley.
002857PC

ELECTRICAL SWITCHES

1. Model MS-SPDT.

The Model MS-SPDT is a miniature electrical switch which can be field mounted in the Model MCH control head and is included with the Model ECH control head. When used with the Model MCH control head, it provides one set of NO/NC dry contacts. It is intended for use with electric power shutoff devices (dealer supplied), electric gas valves, alarms, bells, lights, contactors, and other electrical devices designed to shut off or turn on upon system actuation. The switch is rated for 20 amps @ 125/250 VAC, 1/2 hp @ 125 VAC, and 1 hp @ 250 VAC. See **Figure 2-17**.

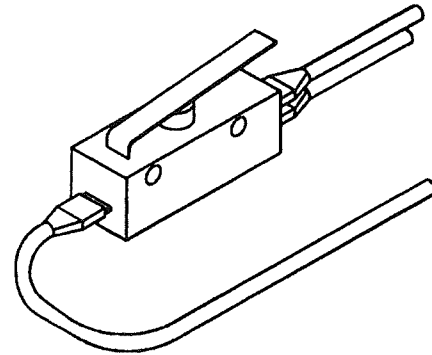


Figure 2-17. Model MS-SPDT Miniature Switch.
002858PC

2. Model MS-DPDT.

The Model MS-DPDT is a miniature electrical switch which can be field mounted in the Model MCH/ECH control head. When used with the Model MCH control head, it provides two sets of NO/NC dry contacts. When used with the Model ECH control head, it provides one set of NO/NC dry contacts. It is intended for use with electric power shutoff devices (dealer supplied), electric gas valves, alarms, bells, lights, contactors, and other electrical devices designed to shut off or turn on upon system actuation. The switch is rated for 20 amps @ 125/250 VAC, 1/2 hp @ 125 VAC, and 1 hp @ 250 VAC. See **Figure 2-18**.

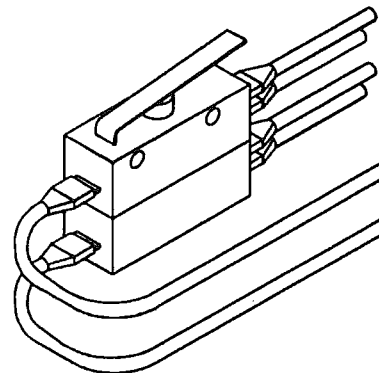


Figure 2-18. Model MS-DPDT Miniature Switch.
002859PC

MODEL SM-120/24 SOLENOID MONITOR

The Model SM-120/24 solenoid monitor is used in conjunction with the Model ECH control head to supervise the actuation and detection circuits. In the event of a problem in the circuit, a light on the monitor goes out. The Model SM-120 is used with the Model ECH-120 control head. The Model SM-24 is used with the Model ECH-24 control head. Two sets of NO/NC dry contacts are provided. The unit mounts directly to a three gang wall outlet box. The Model SM-120 acts as a reset relay when used with an electric gas valve. Electric gas valve wiring instructions are provided in the installation section of this manual. See **Figure 2-19**.

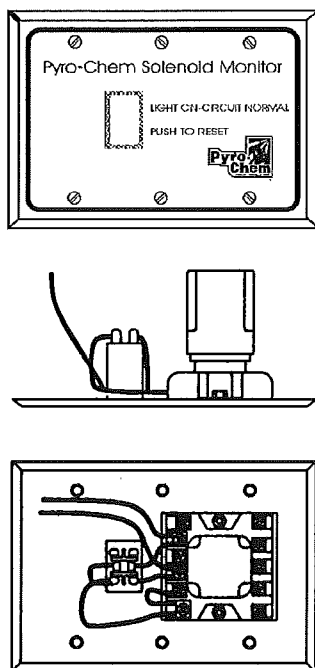


Figure 2-19. Model SM-24/120 Solenoid Monitor.

002860PC

PIPE AND FITTINGS

Pipe and fittings must be furnished by the installer. Schedule 40 stainless steel, chrome plated, or black pipe and fittings must be used. Galvanized pipe and fittings are not to be used.

NOZZLES

Nozzles have been developed for appliance, plenum, and duct applications. All nozzles have a specific flow point value and are supplied with covers to prevent clogging. Application limitations are provided in the design section of this manual.

1. Straight Nozzles.

The following nozzles are of a straight 3/8" female threaded design (see Figure 2-20):

Model	Flow Points
NL-A	1
NL-P	1
NL-RH2	2
NL-R	1
NL-UB	1/2
NL-D1	1
NL-D2	2
NL-D3	3
NL-F1	1
NL-F1.25	1.25

NL-F2	2
NL-FL2	2

Note: The Model NL-D1 Nozzle can be used as a direct replacement for the Model NL-P Nozzle.

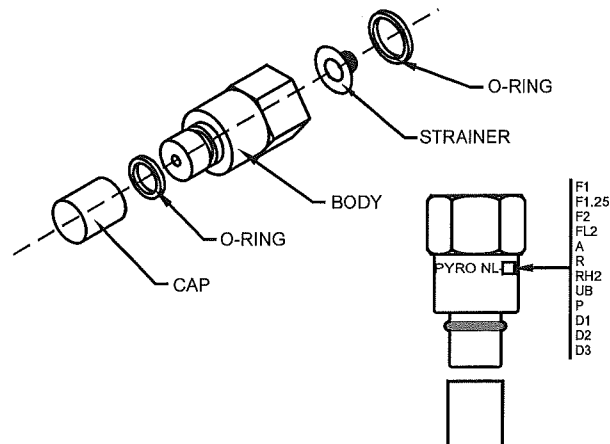


Figure 2-20. Straight Nozzle Design.

002909PC

2. Swivel Nozzles.

The Models NLS-A, NLS-UB, NLS-R, NLS-RH2, NLS-F1 and NLS-F2 swivel nozzles incorporate a swivel joint into the design of the nozzle body to simplify the aiming of the nozzle. These swivel nozzles have the same tip design and flow characteristics as their non-swivel equivalents, Models NL-A, NL-UB, NL-R, NL-RH2, NL-F1 and NL-F2 respectively. A swivel nozzle can be used as a direct substitute for its non-swivel equivalent. They are of a 3/8" female threaded design (see Figure 2-21).

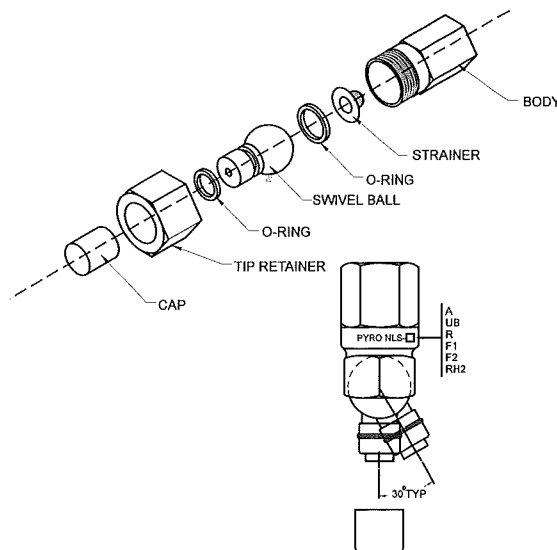


Figure 2-21. Swivel Nozzle Design.

002910PC

COMPONENTS LIST

<u>MODEL NO.</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>	<u>MODEL NO.</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>
PCL-240	2.40 GALLON CYLINDER ASSEMBLY	500-420614	TD-450	THERMAL DETECTOR 450°F	315-120355
PCL-350	3.50 GALLON CYLINDER ASSEMBLY	500-420787	TD-600	THERMAL DETECTOR 600°F	315-120356
PCL-550	5.50 GALLON CYLINDER ASSEMBLY	500-420750	EGVSO-75	ELECTRIC GAS SHUT-OFF VALVE 3/4"	240-120358
PAC-10	PNEUMATIC ACTUATING CYLINDER	500-020104	EGVSO-100	ELECTRIC GAS SHUT-OFF VALVE 1"	240-120359
PAC-200	PNEUMATIC ACTUATING CYLINDER	500-020690	EGVSO-125	ELECTRIC GAS SHUT-OFF VALVE 1-1/4"	240-120360
MB-1	MOUNTING BRACKET (FOR PCL-550)	500-020197	EGVSO-150	ELECTRIC GAS SHUT-OFF VALVE 1-1/2"	240-120361
MB-15	MOUNTING BRACKET (FOR PCL-240/350)	500-020247	EGVSO-200	ELECTRIC GAS SHUT-OFF VALVE 2"	240-120362
MB-P2	MOUNTING BRACKET (FOR MCH ECH-24/120)	320-020853	EGVSO-250	ELECTRIC GAS SHUT-OFF VALVE 2-1/2"	240-120363
MCH	MECHANICAL CONTROL HEAD	500-020845	EGVSO-300	ELECTRIC GAS SHUT-OFF VALVE 3"	240-120385
NMCH	MECHANICAL CONTROL HEAD (NO HANDLE)	500-020609	GVSO-75	MECHANICAL GAS SHUT-OFF VALVE 3/4"	500-020180
EN-MCU	ENCLOSURE (FOR PRIMARY CYLINDER)	500-420965	GVSO-100	MECHANICAL GAS SHUT-OFF VALVE 1"	500-020181
EN-S	ENCLOSURE (FOR SECONDARY CYLINDER)	500-420966	GVSO-125	MECHANICAL GAS SHUT-OFF VALVE 1-1/4"	500-020182
ECH-24	24VDC ELECTRICAL CONTROL HEAD	500-120842	GVSO-150	MECHANICAL GAS SHUT-OFF VALVE 1-1/2"	500-020183
ECH-120	120VAC ELECTRICAL CONTROL HEAD	500-120846	GVSO-200	MECHANICAL GAS SHUT-OFF VALVE 2"	500-020184
NL-A	10 x WET NOZZLE	731-420723	GVSO-250	MECHANICAL GAS SHUT-OFF VALVE 2-1/2"	500-020185
NLS-A	10 x WET SWIVEL NOZZLE	731-420753	GVSO-300	MECHANICAL GAS SHUT-OFF VALVE 3"	500-020186
NL-D2	10 x WET NOZZLE	731-420769	MS-SPDT	MINI SWITCH - SINGLE POLE DOUBLE THROW	500-020227
NL-D3	10 x WET NOZZLE	731-420765	MS-DPDT	MINI SWITCH - DOUBLE POLE DOUBLE THROW	500-020237
NL-F1	10 x WET NOZZLE	731-420277	CO2-6	6 x CO2 CARTRIDGE	900-020060
NLS-F1	10 x WET SWIVEL NOZZLE	731-420751	MCP-1	COMPRESSION TYPE CORNER PULLEY	500-020849
NL-F1.25	10 x WET NOZZLE	731-420770	CP- 1	SCREW TYPE CORNER PULLEY	500-020040
NL-F2	10 x WET NOZZLE	731-420771	TP-1	TEE PULLEY	490-020166
NLS-F2	10 x WET SWIVEL NOZZLE	731-420278	490-020831	WET VALVE CAP	490-020831
NL-FL2	10 x WET NOZZLE	731-420773	385-420705	CONICAL SPRING (WET VALVE)	385-420705
NL-D1	10 x WET NOZZLE	731-420722	732-420713	PRESSURE GAGE (WET VALVE)	732-420713
NL-R	10 x WET NOZZLE	731-420725	490-420698	WET VALVE REBUILDING KIT	490-420698
NLS-R	10 x WET SWIVEL NOZZLE	731-420754	VT-1	VALVE TOOL (WET VALVE)	235-420788
NL-RH2	10 x WET NOZZLE	731-420772	325-420716	NECK O-RING (WET VALVE)	325-420716
NLS-RH2	10 x WET SWIVEL NOZZLE	731-420752	712-420707	PISTON (WET VALVE)	712-420707
NL-UB	10 x WET NOZZLE	731-420724	325-420715	PISTON O-RING (WET VALVE)	325-420715
NLS-UB	10 x WET SWIVEL NOZZLE	731-420755	325-420714	VALVE CAP O-RING (WET VALVE)	325-420714
RPS-M	REMOTE MECHANICAL PULL STATION	500-020143	RL-165	1.65 GALLON RECHARGE	500-420693
FLK-1	10 FUSIBLE LINK BRACKET KIT	500-020035	RL-240	2.40 GALLON RECHARGE	500-420033
FLK-1A	8 FUSIBLE LINK BRACKET KIT	500-020041	RL-275	2.75 GALLON RECHARGE	500-420694
FLH-25	25 x FUSIBLE LINK HANGER	320-020866	RL-350	3.50 GALLON RECHARGE	500-420034
FL-165	FUSIBLE LINK 165°F	320-120368	305-420623	10 x WET NOZZLE CAP	305-420623
FL-212	FUSIBLE LINK 212°F	320-120365	325-420626	10 x WET NOZZLE STRAINER	325-420626
FL-280	FUSIBLE LINK 280°F	320-120366	325-420625	10 x WET NOZZLE O-RING	325-420625
FL-360	FUSIBLE LINK 360°F	105-020009	325-020028	10 x VALVE STEM O-RING	325-020028
FL-450	FUSIBLE LINK 450°F	320-120367	490-420720	COMPLETE WET VALVE ASSEMBLY	490-420720
FL-500	FUSIBLE LINK 500°F	105-020165	PCL-AK	RECHARGE ADAPTOR KIT	500-420735
SM-24	24VDC SOLENOID MONITOR	490-120303			
SM-120	120VAC SOLENOID MONITOR	490-120302			
TD-140	THERMAL DETECTOR 140°F	315-120351			
TD-190	THERMAL DETECTOR 190°F	315-120352			
TD-225	THERMAL DETECTOR 225°F	315-120353			
TD-325	THERMAL DETECTOR 325°F	315-120354			

CHAPTER III SYSTEM DESIGN

This section will cover the proper design of the Pyro-Chem Restaurant Fire Suppression System. It is divided into four (4) sections:

1. Nozzle Coverage and Placement.
2. Cylinder Sizing.
3. Piping Limitations.
4. Detector Requirements.

Each of these sections must be completed before attempting any installation.

SECTION 1 Nozzle Coverage and Placement

This section will provide guidelines for determining nozzle type, positioning, and quantity for duct, plenum, and appliance protection.

A. Duct Protection

The following three (3) nozzles have been developed for the protection of exhaust ducts:

1. Model NL-P.
2. Model NL-D2.
3. Model NL-D3.

Each nozzle is approved for use with the exhaust fan dampened, undampened with the fan on, or undampened with the fan off. It is not required that the fan be shut down or the exhaust duct be dampened for the system to operate properly. Each nozzle is approved to protect exhaust ducts of unlimited length.

1. Model NL-P

The Model NL-P nozzle is a one (1) flow point nozzle designed for the protection of exhaust ducts. One (1) or two (2) Model NL-P nozzles can be used on a single duct branch.

A single Model NL-P exhaust duct nozzle can protect a square or rectangular duct with a maximum perimeter of 50 inches and a maximum one-side length of 17 inches. It can also protect a round duct with a maximum circumference of 50 inches and a maximum diameter of 16 inches (see **Figure 3-1**). The nozzle must be installed on the centerline of the duct and aimed directly into the duct opening (see **Figure 3-2**).

Two (2) Model NL-P exhaust duct nozzles can protect a square or rectangular duct with a maximum perimeter of 84 inches and a maximum one-side length of 34 inches. They can also protect a round duct with a maximum circumference of 84 inches and a maximum diameter of 26.5 inches. When two (2) Model NL-P nozzles are used to protect a single duct, the cross sectional area of the duct must be divided into two equal symmetrical areas. The nozzle must then be installed on the centerline of the area it protects and aimed directly into the duct opening (see **Figure 3-2.1**).

2. Model NL-D2.

The Model NL-D2 nozzle is a two (2) flow point nozzle designed for the protection of exhaust ducts. Only one (1) Model NL-D2 nozzle can be used on a single duct branch.

A single Model NL-D2 exhaust duct nozzle can protect a square or rectangular duct with a maximum perimeter of 75.5 inches and a maximum one-side length of 25 inches. It can also protect a round duct with a maximum circumference of 75.5 inches and a maximum diameter of 24 inches (see **Figure 3-1**). The nozzle must be installed on the centerline of the duct and aimed directly into the duct opening (see **Figure 3-2**).

3. Model NL-D3.

The Model NL-D3 nozzle is a three (3) flow point nozzle designed for the protection of exhaust ducts. One (1) or two (2) Model NL-D3 nozzles can be used on a single duct branch.

A single Model NL-D3 exhaust duct nozzle can protect a square or rectangular duct with a maximum perimeter of 100 inches and a maximum one-side length of 33 inches. It can also protect a round duct with a maximum circumference of 100 inches and a maximum diameter of 31.75 inches (see **Figure 3-1**). The nozzle must be installed on the centerline of the duct and aimed directly into the duct opening (see **Figure 3-2**).

Two (2) Model NL-D3 exhaust duct nozzles can protect a square or rectangular duct with a maximum perimeter of 150 inches and a maximum one-side length of 66 inches. They can also protect a round duct with a maximum circumference of 150 inches and a maximum diameter of 47.5 inches. When two (2) Model NL-D3 nozzles are used to protect a single duct, the cross sectional area of the duct must be divided into two equal symmetrical areas. The nozzle must then be installed on the centerline of the area it protects and aimed directly into the duct opening (see **Figure 3-2.1**).

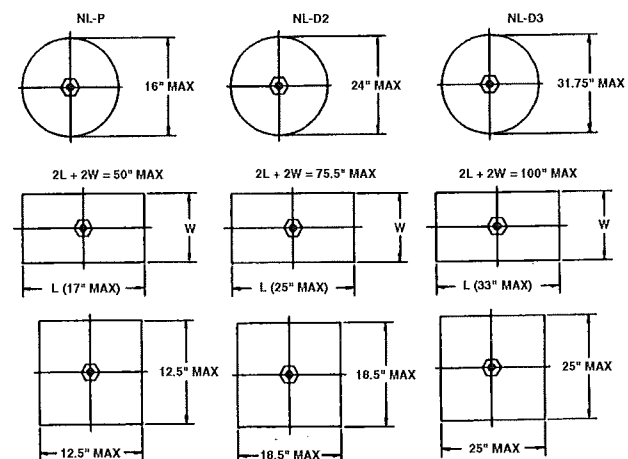


Figure 3-1. Duct Nozzle Coverage Limitations.

002911PC

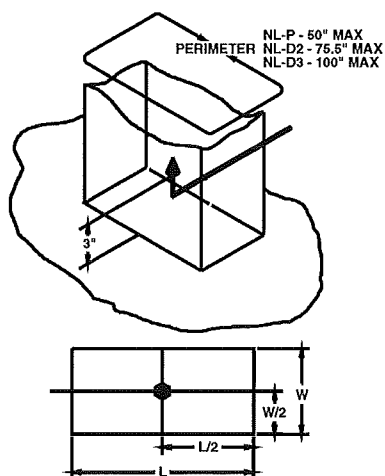


Figure 3-2. Single Nozzle Placement In Duct.

002912PC

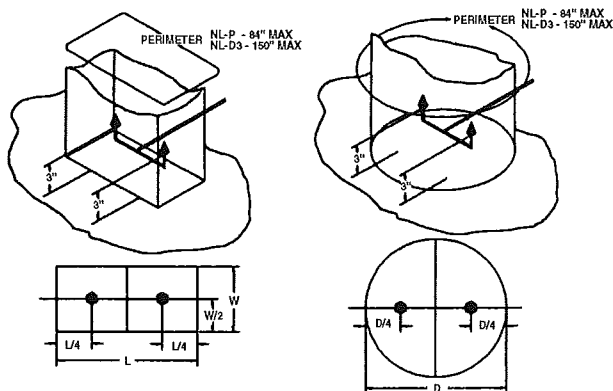


Figure 3-2.1. Dual Nozzle Placement In Duct.

002913PC

Duct Nozzle Coverage Chart

NOZZLE	MAXIMUM SIDE	MAXIMUM PERIMETER	FLOW POINTS
NL-P	17"	50"	1
2 x NL-P	34"	84"	2
NL-D2	25"	75"	2
NL-D3	33"	100"	3
2 x NL-D3	66"	150"	6

NOTE: A SINGLE DUCT BRANCH CAN ONLY SUPPORT:

- 1) A Single NL-P
- 2) A Single NL-D2
- 3) A Single NL-D3
- 4) Two NL-P's
- 5) Two NL-D3's

B. Plenum Protection

The Model NL-A nozzle is a one (1) flow point nozzle that has been developed to protect the plenum section of the exhaust hood. Only one (1) Model NL-A nozzle can be used on a single plenum branch. A single Model NL-A can protect a plenum (with single or V-Bank filters) with rectangular dimensions of 8' x 4' or less. Larger plenums can be protected by dividing the hazard area so that each nozzle protects an area of 8' x 4' or less (see **Figure 3-3**).

The nozzle(s) must be located at the center of the V-Bank width or centered between the filter width when used with a single bank filter plenum. It must be within 4" of the wall it is mounted against (see **Figure 3-4**).

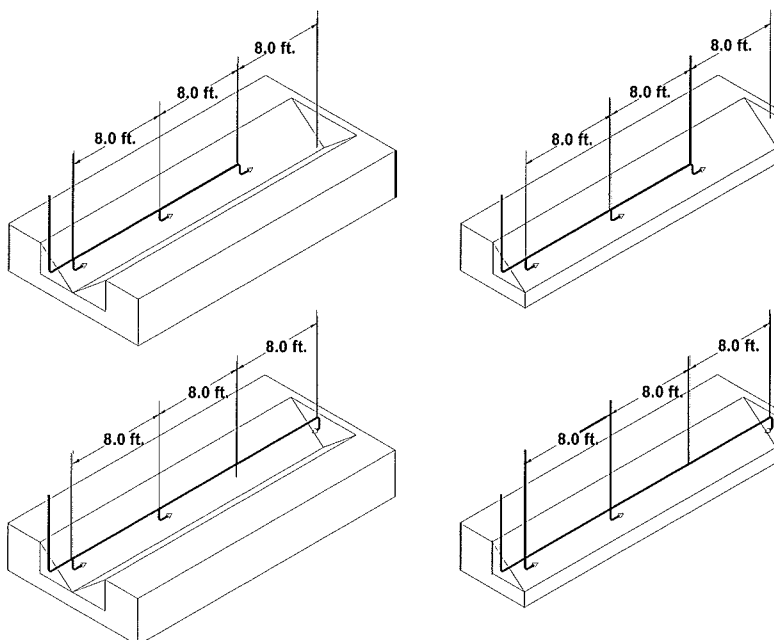


Figure 3.3 Plenum Coverage Limitations, Model NL-A Nozzle.

002914PC

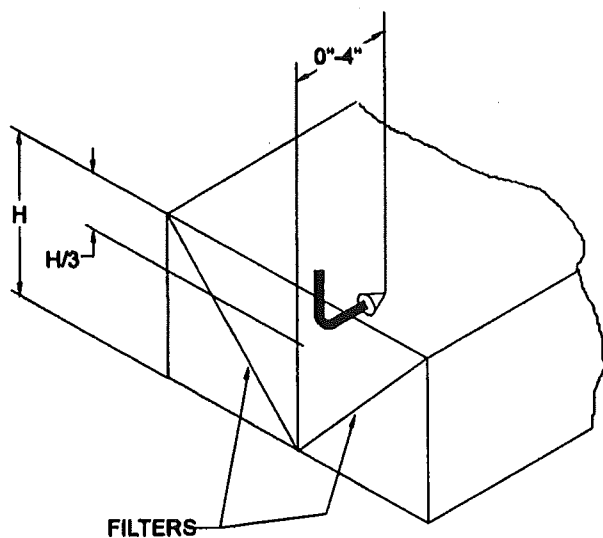


Figure 3-4. Model NL-A Plenum Nozzle Placement.

002915PC

C. Appliance Protection

1. Range Coverage.

The Model NL-F1.25 is a 1.25 flow point nozzle that is used for range top protection. The maximum range top area that can be protected by a single NL-F1.25 nozzle is 12" x 30". See Figure 3-5.

a. Nozzle Location.

Side To Side Nozzle Location:

The nozzle must be located on the longest centerline of the protected zone.

Front To Back Nozzle Location:

The nozzle must be located not more than 9" from the center of the protected zone.

Nozzle Height:

The nozzle must be mounted 40" to 50" above the cooking surface.

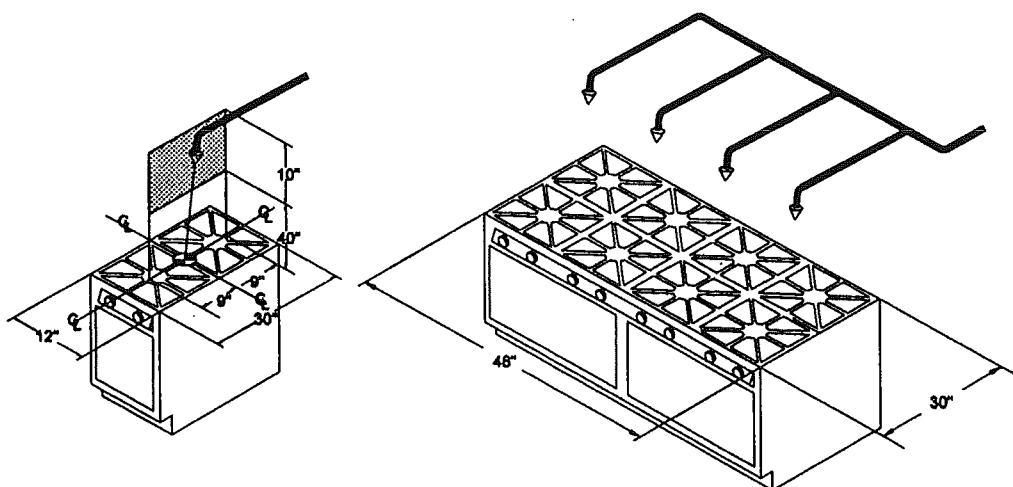


Figure 3.5. Model NL-F1.25 Range Nozzle Placement.

002916PC

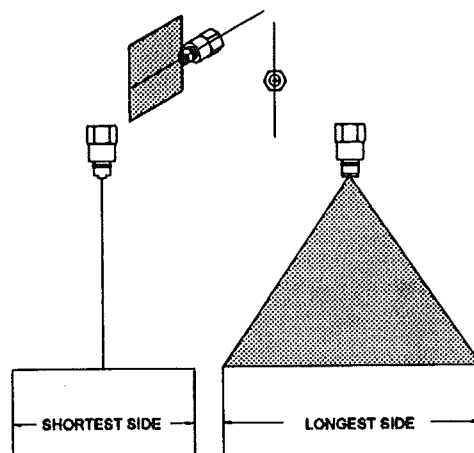


Figure 3.6. Model NL-F1.25 Range Nozzle Aiming.

002917PC

b. Nozzle Aiming.

The tip of the Model NL-F1.25 nozzle has two flat areas designed to assist aiming. The nozzle must be positioned so that these flat areas are parallel to the longest side of the protected zone. See **Figure 3-6**.

2. Griddle Coverage.

The Model NL-R nozzle is a one (1) flow point nozzle that is used for griddle protection. The maximum griddle area that can be protected by a single NL-R nozzle is 30" x 30".

The nozzle must be located over the griddle cooking surface, no more than six (6) inches from the edge of the protected zone. The nozzle must be aimed at the center of the protected zone. The nozzle must be mounted 24" to 50" above the cooking surface. See **Figure 3-7**.

NOTE

Nozzle shall be located anywhere in the shaded area and aimed at the center of the protected zone.

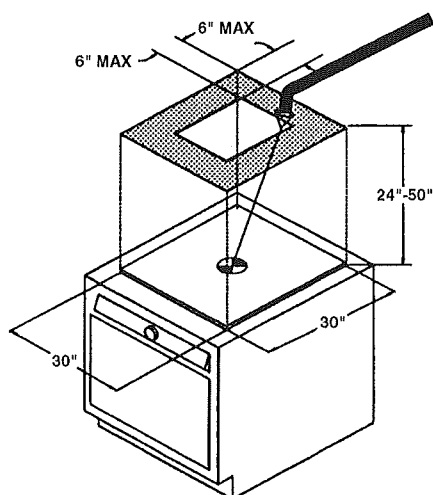


Figure 3-7. Model NL-R Nozzle Placement, Griddle.

002918PC

3. Deep Fat Fryer Coverage.

The Model NL-F2 nozzle is a two (2) flow point nozzle that is used for the protection of a single vat of a deep fat fryer. The maximum area that can be protected by a single NL-F2 nozzle is:

1. Cooking Area: 14.75" x 14"
2. Integral Drip Board: 14.75" x 7.5"

The nozzle must be located over the cooking surface and aimed at the center of the protected zone. The nozzle must be mounted 30" to 50" above the top surface of the deep fat fryer (see **Figure 3-8**).

The tip of the Model NL-F2 nozzle has two flat areas designed to assist aiming. The nozzle must be positioned so that these flat areas are parallel to the longest side of the protected zone. See **Figure 3-8.1**.

NOTE

Nozzle shall be located anywhere in the shaded area and aimed at the center of the protected zone.

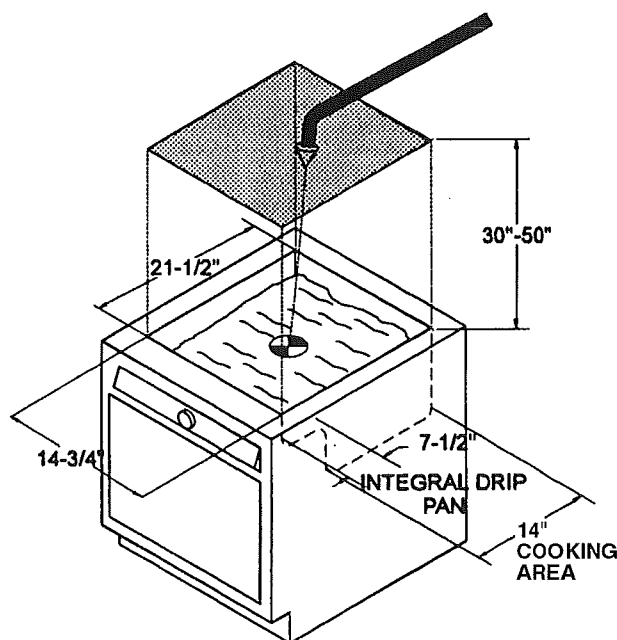


Figure 3-8. Model NL-F2 Nozzle Placement, Deep Fat Fryer.

002919PC

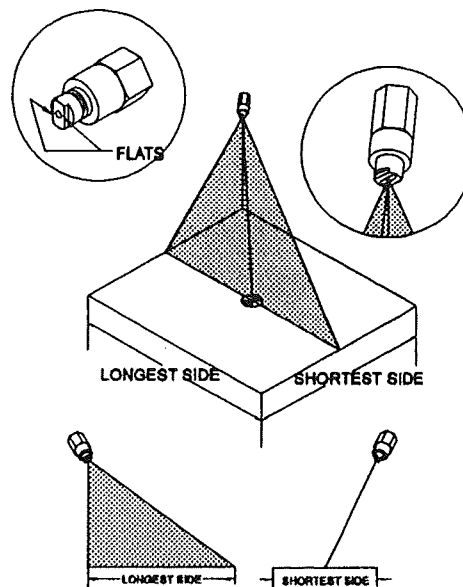


Figure 3-8.1. Model NL-F2 Nozzle Aiming.

002920PC

3.1. Deep Fat Fryer Coverage.

The Model NL-F2 nozzle is a two (2) flow point nozzle that is used for the protection of a single vat of a deep fat fryer. The maximum area that can be protected by a single NL-F2 nozzle is:

1. Cooking Area: 18" x 18"
2. Integral Drip Board: 18" x 9.75"

The nozzle must be located within 11.875" of the center of the longest side, and within 7" of the center of the shortest side of the cooking surface and aimed at the center of the protected zone. The nozzle must be mounted 30" to 42" above the top surface of the deep fat fryer (see **Figure 3-8.2**).

The tip of the Model NL-F2 nozzle has two flat areas designed to assist aiming. The nozzle must be positioned so that these flat areas are parallel to the longest side of the protected zone. See **Figure 3-8.1**.

NOTE

Nozzle shall be located anywhere in the shaded area and aimed at the center of the protected zone.

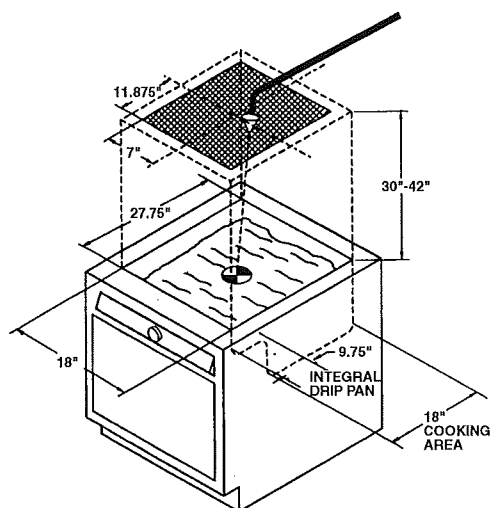


Figure 3-8.2. Model NL-F2 Nozzle Placement, Deep Fat Fryer.

002921PC

NOTE

For installations that require the use of the Model NL-F2 or the Model NL-FL2 nozzle to protect a deep fat fryer in accordance with Deep Fat Fryer Coverage 3.1 shown here (See **Figure 3-8.2** and **Figure 3-8.3**), the following additional restrictions apply to the main supply line piping before this nozzle:

1. Minimum length, linear: 8 feet
2. Minimum length, equivalent: 14.1 feet
3. Minimum system flow points: 4
4. Minimum branches (total): 3

3.2 Deep Fat Fryer Coverage.

The Model NL-FL2 nozzle is a two (2) flow point nozzle that is used for the protection of a single vat of a deep fat fryer. The maximum area that can be protected by a single NL-FL2 nozzle is:

1. Cooking Area: 18" x 18"
2. Integral Drip Board: 18" x 9.75"

The nozzle must be located within 11.875" of the center of the longest side, and within 3" of the center of the shortest side of the cooking surface and aimed at the center of the protected zone. The nozzle must be mounted 16" to 26" above the top surface of the deep fat fryer (see **Figure 3-8.3**).

NOTE

Nozzle shall be located anywhere in the shaded area and aimed at the center of the protected zone.

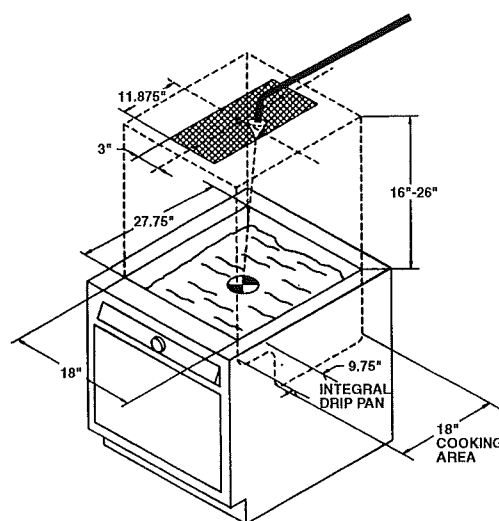


Figure 3-8.3. Model NL-FL2 Nozzle Placement, Deep Fat Fryer.

002922PC

1.1. Range Coverage.

The Model NL-RH2 is a 2 flow point nozzle that is used for range top protection. The maximum range top area that can be protected by a single NL-RH2 nozzle is 28" x 28". The nozzle must be located within 5" of the center of the protected zone, and aimed at the center of the protected zone. The nozzle must be mounted 32" to 45" above the cooking surface. See **Figure 3-8.4**.

1.2. Range Coverage.

The Model NL-F1 is a 1 flow point nozzle that is used for range top protection. The maximum range top area that can be protected by a single NL-F1 nozzle is 12" x 28". See **Figure 3-8.5**.

a. Nozzle Location.

Side To Side Nozzle Location:

The nozzle must be located on the longest centerline of the protected zone.

Front To Back Nozzle Location:

The nozzle must be located not more than 6" from the center of the protected zone.

Nozzle Height:

The nozzle must be mounted 15" to 30" above the cooking surface.

b. Nozzle Aiming.

The tip of the Model NL-F1 nozzle has two flat areas designed to assist aiming. The nozzle must be positioned so that these flat areas are parallel to the longest side of the protected zone. See **Figure 3-6**.

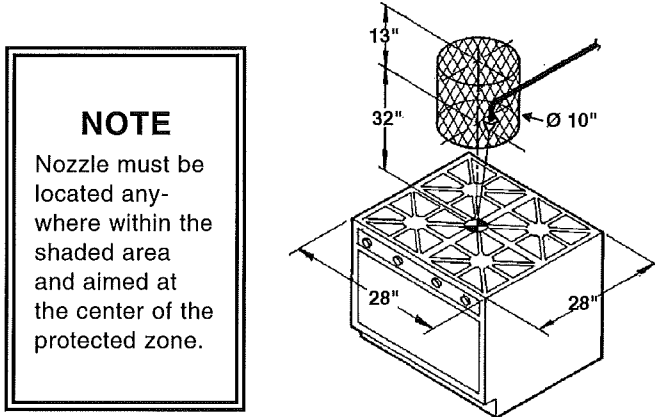
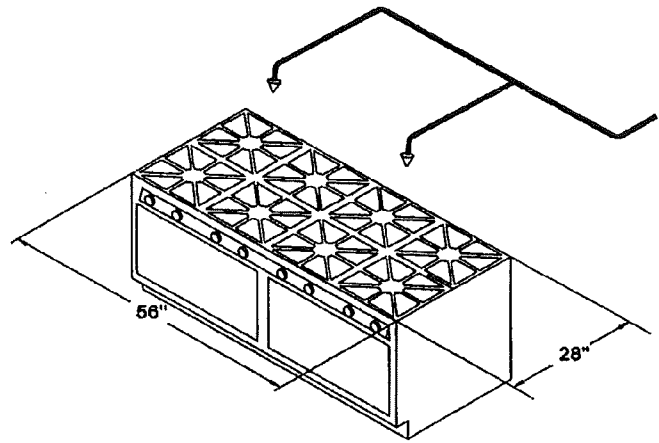


Figure 3-8.4. Model NL-RH2 Range Nozzle Placement

002923PC



NOTE

For installations that require the use of the Model NL-RH2 or NL-F1 nozzle to protect a range in accordance with Range Coverage 1.1 or 1.2 shown here (See **Figure 3-8.4** and **Figure 3-8.5**), the following additional restrictions apply to the main supply line piping before this nozzle:

1. Minimum length, linear: 8 feet
2. Minimum length, equivalent: 14.1 feet
3. Minimum system flow points: 4
4. Minimum branches (total): 3

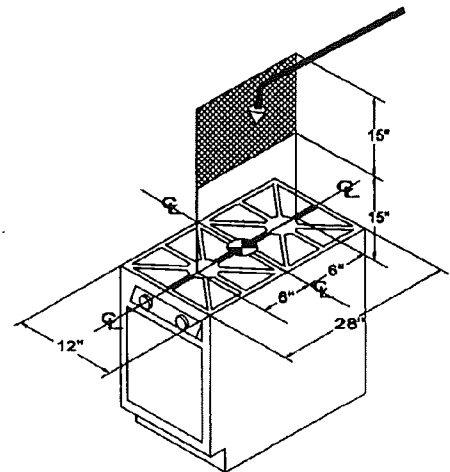


Figure 3-8.5. Model NL-F1 Range Nozzle Placement

002924PC

3.3. Modular Deep Fat Fryer Coverage.

The Model NL-F2 nozzle is a two (2) flow point nozzle that is used for the protection of a single vat of a deep fat fryer. The maximum area that can be protected by two (2) NL-F2 nozzles is:

1. Cooking Area: 22" x 22"
2. Integral Drip Board: 22" x 5.75"

To protect a fryer with the above maximum dimensions or smaller, the area is divided into two equal areas, with a single NL-F2 nozzle protecting each area. Each nozzle must be located within a section (as noted by the shaded area in Figure 3-8.6), that is not less than 2" from the fryer perimeter and not less than 1" from the fryer's shortest side centerline.

Each nozzle, regardless of its location within its section, must be aimed at a point located at the center of the longest side and 1" from the center of the shortest side. See **Figure 3-8.6**.

The nozzle must be mounted 30" to 42" above the top surface of the deep fat fryer (see **Figure 3-8.6**).

The tip of the Model NL-F2 nozzle has two flat areas designed to assist aiming. The nozzle must be positioned so that these flat areas are parallel to the longest side of the protected zone. See **Figure 3-8.1**.

NOTE

For installations that require the use of the Model NL-F2 nozzle to protect a deep fat fryer in accordance with the Modular Deep Fat Fryer Coverage 3.3 shown here, the following additional restrictions apply to the main supply line piping before this nozzle:

1. Minimum length, linear: 8 feet
2. Minimum length, equivalent: 14.1 feet
3. Minimum system flow points: 4
4. Minimum branches (total): 3

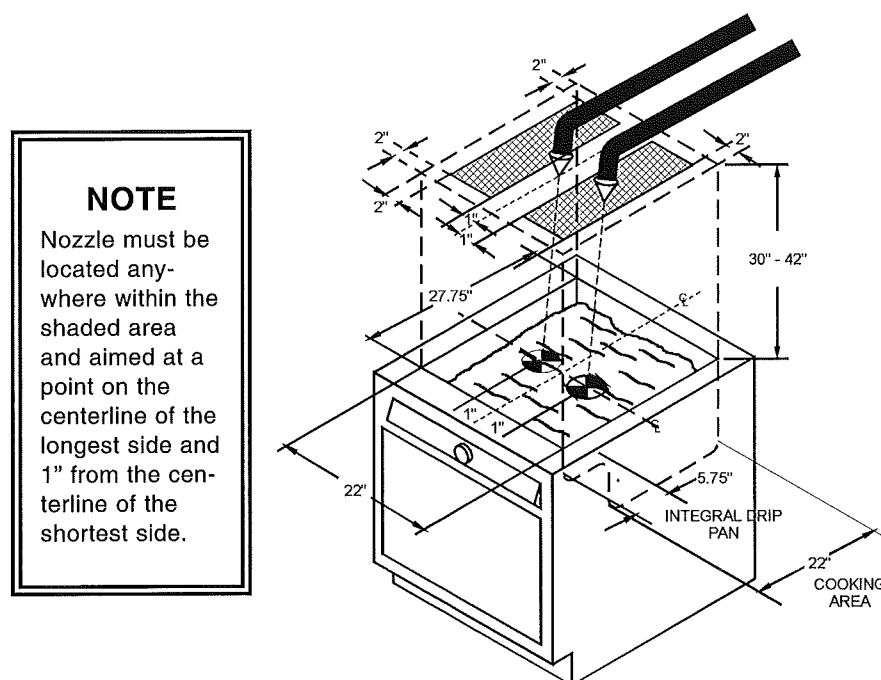


Figure 3-8.6. Model NL-F2 Nozzle Placement, Deep Fat Fryer.

3.4. Modular Deep Fat Fryer Coverage.

The Model NL-FL2 nozzle is a two (2) flow point nozzle that is used for the protection of a single vat of a deep fat fryer. The maximum area that can be protected by two (2) NL-FL2 nozzles is:

1. Cooking Area: 22" x 22"
2. Integral Drip Board: 22" x 5.75"

To protect a fryer with the above maximum dimensions or smaller, the area is divided into two equal areas, with a single NL-FL2 nozzle protecting each area. Each nozzle must be located within a section (as noted by the shaded area in **Figure 3-8.7**), that is:

1. Not less than 6" from the fryer's longest side perimeter,
2. Not less than 2" from the fryer's shortest side perimeter, and
3. Not less than 1" from the fryer's shortest side centerline.

Each nozzle, regardless of its location within its section, must be aimed at a point located at the center of the longest side and 1" from the center of the shortest side. See **Figure 3-8.7**.

The nozzle must be mounted 16" to 26" above the top surface of the deep fat fryer (see **Figure 3-8.7**).

NOTE

For installations that require the use of the Model NL-FL2 nozzle to protect a deep fat fryer in accordance with the Modular Deep Fat Fryer Coverage 3.4 shown here, the following additional restrictions apply to the main supply line piping before this nozzle:

1. Minimum length, linear: 8 feet
2. Minimum length, equivalent: 14.1 feet
3. Minimum system flow points: 4
4. Minimum branches (total): 3

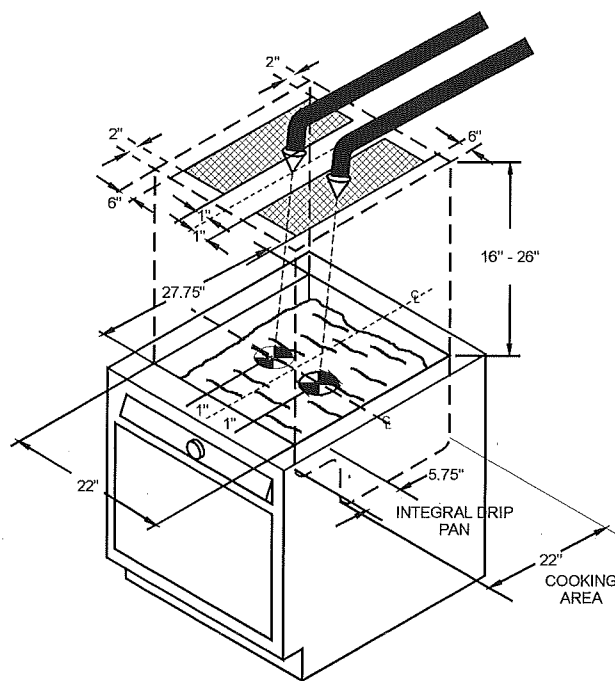
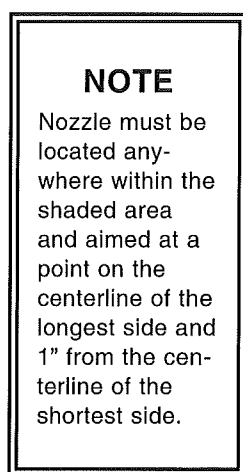


Figure 3-8.7. Model NL-FL2 Nozzle Placement, Deep Fat Fryer.

002925PC

2.1 Low Proximity Griddle Protection

The Model NL-D2 nozzle is a two (2) flow point nozzle that is used for griddle protection. The maximum griddle area that can be protected by a single NL-D2 nozzle is 48" x 30".

Option 1

The nozzle must be located over the griddle cooking surface, within 12" of the center of the longest side and within 3" of the edge of the protected zone. The nozzle must be aimed at a point on the center line of the longest side and 10" from the edge of the longest side of the protected zone. The nozzle must be mounted 10" to 41" above the cooking surface. See **Figure 3-8.5**.

NOTE

Nozzles shall be located at the front or rear of the griddle, anywhere in the shaded area and aimed at the center of the protected zone.

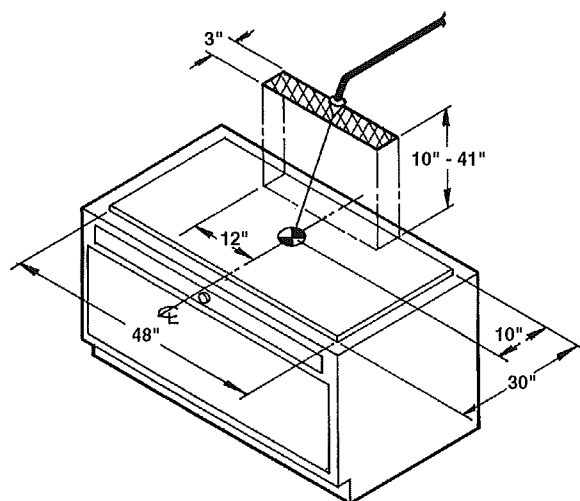


Figure 3-8.8. Option 1: Model NL-D2 Nozzle Placement, Griddle.

002926PC

Option 2

The nozzle must be located over the griddle cooking surface, within 6" of the center of the shortest side and within 3" of the edge of the protected zone. The nozzle must be aimed at a point on the center line of the shortest side and 16" from the edge of the shortest side of the protected zone. The nozzle must be mounted 10" to 41" above the cooking surface. See **Figure 3-8.4**.

NOTE

Nozzles shall be located on the left or right side of the griddle, anywhere in the shaded area and aimed at the center of the protected zone.

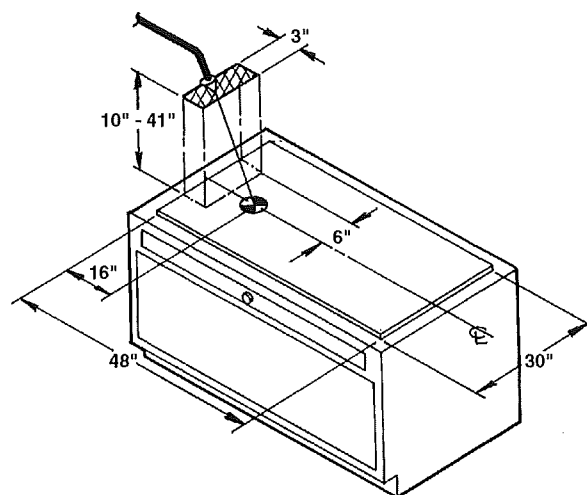


Figure 3-8.9. Option 2: Model NL-D2 Nozzle Placement, Griddle.

002927PC

Chapter 3 – System Design
Page 3-4f

NOTES:

4. Radiant Charbroiler Coverage.

NOTE

A radiant charbroiler is distinguished by the use of gas or electrically heated metal strips (radiants) that are used for cooking.

The Model NL-R nozzle is a one (1) flow point nozzle that is used to protect either gas or electrically fueled radiant charbroilers. The maximum area that can be protected by a single NL-R nozzle is 25" x 25".

The nozzle must be located over the cooking surface and aimed at the center of the protected zone. The nozzle must be mounted 24" to 50" above the cooking surface. See **Figure 3-9**.

NOTE

Nozzle shall be located anywhere in the shaded area and aimed at the center of the protected zone.

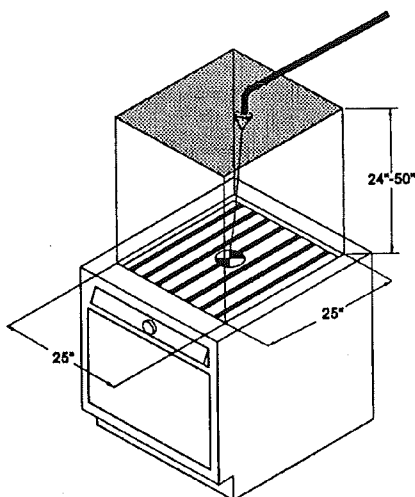


Figure 3-9. Model NL-R Nozzle Placement, Radiant Charbroiler.

002928PC

5. Synthetic Rock Charbroiler Coverage.

NOTE

A synthetic rock charbroiler is distinguished by the use of lava, pumice, or synthetic rocks that are used for cooking.

The Model NL-F2 nozzle is a two (2) flow point nozzle that is used for the protection of either gas or electrically fueled synthetic rock charbroiler. The maximum fuel depth shall not exceed two (2) layers of lava, pumice, or synthetic rocks. The maximum area that can be protected by a single NL-F2 nozzle is 25" x 25".

The nozzle must be located over the cooking surface and aimed at the center of the protected zone. The nozzle must be mounted 30" to 50" above the cooking surface (see **Figure 3-10**).

The tip of the Model NL-F2 nozzle has two flat areas designed to assist aiming. The nozzle must be positioned so that these flat areas are parallel to the longest side of the protected zone. See **Figure 3-8.1**.

NOTE

Nozzle shall be located anywhere in the shaded area and aimed at the center of the protected zone.

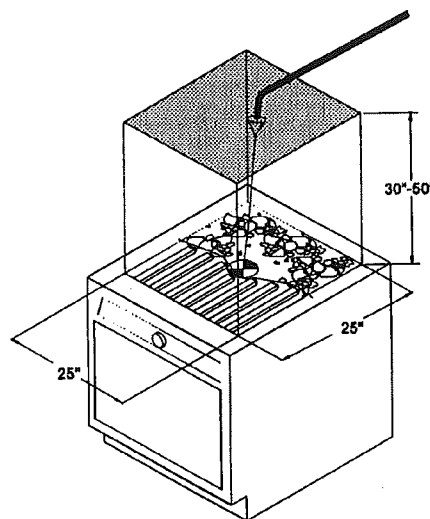


Figure 3-10. Model NL-F2 Nozzle Placement, Synthetic Rock Charbroiler.

002929PC

6. Natural Class "A" Charbroiler Coverage.

NOTE

A Class "A" charbroiler is distinguished by the use of charcoal, mesquite chips, chunks, and/or logs that are used for cooking.

The Model NL-A nozzle is used for the protection of Class "A" charbroilers with a maximum fuel depth of six (6) inches. The maximum area that can be protected by a single NL-A nozzle is 20" x 24".

The nozzle must be located over the cooking surface and aimed at the center of the protected zone. The nozzle must be mounted 15" to 35" above the cooking surface. See **Figure 3-11**.

NOTE

Nozzle shall be located anywhere in the shaded area and aimed at the center of the protected zone.

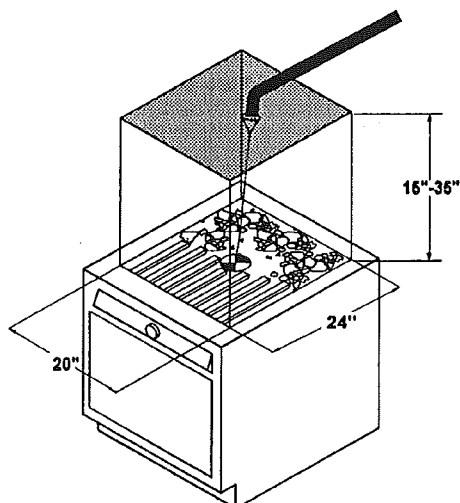


Figure 3-11. Model NL-A Nozzle Placement,
 Class "A" Charbroiler.

002930PC

7. Upright Broiler Coverage.

The Model NL-UB nozzle is a one-half (1/2) flow point nozzle that is used for upright broiler protection. Two (2) Model NL-UB nozzles are commonly used for this application. The purpose of using two nozzles is to distribute the chemical evenly between the cooking surface (on top) and the drip pan (below). For upright broilers that have no drip pan, a single Model NL-UB nozzle can be used. The maximum area that can be protected by a pair of NL-UB nozzles (or a single NL-UB nozzle when no drip pan is present) is 30" x 34".

One nozzle must be positioned in the front entrance of the broiling chamber and aimed at the diagonal corner. The nozzle will be positioned above the cooking surface. If necessary, the second nozzle must be installed above the front edge of the grease drip pan and aimed at its midpoint. See **Figure 3-12**.

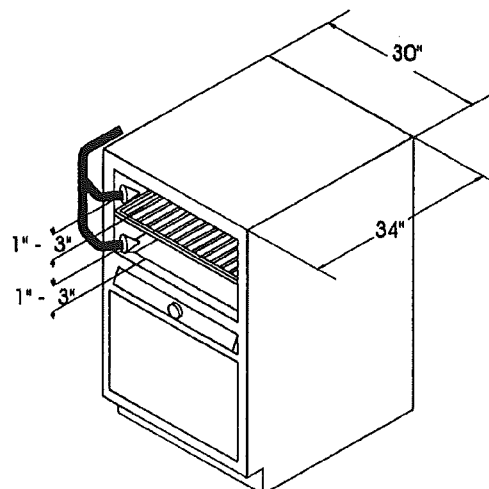


Figure 3-12. Model NL-UB Nozzle Placement,
 Upright Broiler.

002931PC

8. Chain Broiler Coverage.

Two types of chain broilers are commonly used; open and closed top. Each is protected in a different manner.

a. Close Top Chain Broiler Coverage.

The Model NL-UB nozzle is a one-half (1/2) flow point nozzle that is used for closed top chain broiler protection. Two (2) Model NL-UB nozzles are commonly used for this application. The purpose of using two nozzles is to distribute the chemical evenly between the cooking surface (on top) and the drip pan (below). For closed top chain broilers that have no drip pan, a single Model NL-UB nozzle can be used. The maximum area that can be protected by a pair of NL-UB nozzles (or a single NL-UB nozzle when no drip pan is present) is 30" x 34".

One nozzle must be positioned in the front entrance of the broiling chamber and aimed at the diagonal corner. The nozzle will be positioned above the cooking surface. The second nozzle (if necessary) must be installed above the front edge of the grease drip pan and aimed at its midpoint. See **Figure 3-13**.

8.1 Tilting Skillet/Braising Pan Coverage.

The Model NL-F2 nozzle is a two (2) flow point nozzle that is used for the protection of a tilting skillet/braising pan. The maximum area that can be protected by a single NL-F2 nozzle is 27.75" x 18". The nozzle is located over the skillet cooking surface:

1. From the front edge (away from the lid): no less than 2" and no greater than 1/4 the distance of the appliance depth.
2. From the sides - no less than 2" from the edge of the appliance or the edge of the protected zone.

The nozzle must be mounted 30" to 36" inches above the top surface of the tilting skillet/braising pan, and aimed at the center of the protected zone. See **Figure 3-12.1**.

The tip of the Model NL-F2 nozzle has two flat areas designed to assist aiming. The nozzle must be positioned so that these flat areas are parallel to the longest side of the protected zone. See **Figure 3-8.1**.

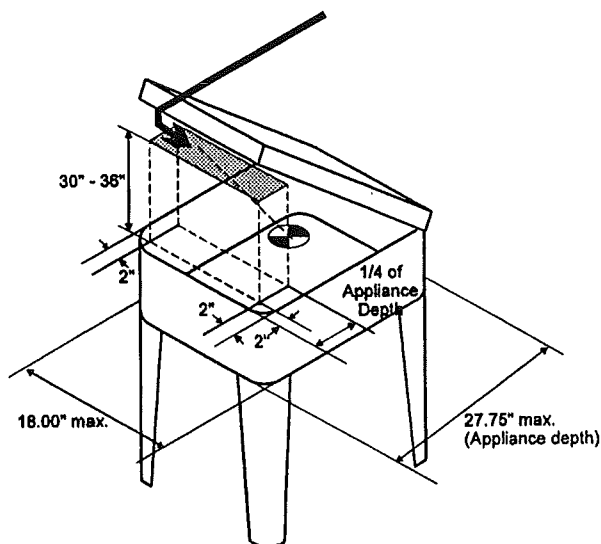


Figure 3-12.1. Model NL-F2 Nozzle Placement, Tilting Skillet/Braising Pan.

002932PC

NOTE

Nozzle shall be located anywhere within the shaded area and aimed at the center of the protected zone. The nozzle is to be located as to minimize the potential for the skillet cover to interfere with the nozzle discharge.

8.2 Tilting Skillet/Braising Pan Coverage.

The Model NL-FL2 nozzle is a two (2) flow point nozzle that is used for the protection of a tilting skillet/braising pan. The maximum area that can be protected by a single NL-FL2 nozzle is 27.75" x 18". The nozzle is located over the skillet cooking surface:

1. From the front edge (away from the lid): no less than 2" and no greater than 1/4 the distance of the appliance depth.
2. From the sides - no greater than 3" from the centerline of the shortest side of the protected zone

The nozzle must be mounted 16" to 26" inches above the top surface of the tilting skillet/braising pan, and aimed at the center of the protected zone. See **Figure 3-12.2**.

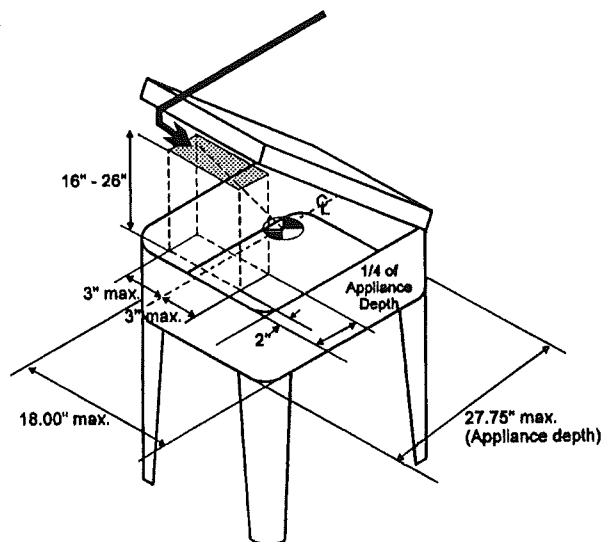


Figure 3-12.2. Model NL-FL2 Nozzle Placement, Tilting Skillet/Braising Pan.

002933PC

NOTE

Nozzle shall be located anywhere within the shaded area and aimed at the center of the protected zone. The nozzle is to be located as to minimize the potential for the skillet cover to interfere with the nozzle discharge.

8.3 Electrostatic Precipitator Coverage.

Some restaurant ventilating systems may utilize an electrostatic precipitator to facilitate the removal of grease laden vapor. These precipitators are typically located at or near the base of the exhaust duct. If protection for electrostatic precipitators is required by the local "authority having jurisdiction," the following guidelines should be followed.

1) Nozzle Placement

Ducts having electrostatic precipitators are protected by using the appropriate duct nozzle(s) (as per Chapter 3, Section 1) above the precipitator and a Model NL-UB Nozzle for the precipitator itself.

The duct nozzle(s) must be installed above the precipitator and aimed in the direction of air flow. One (1) Model NL-UB nozzle must be used to protect the precipitator. The nozzle is to be centered 10 to 26 inches before the precipitator with its discharge point aimed at the center of the precipitator. See **Figure 3-12.3**.

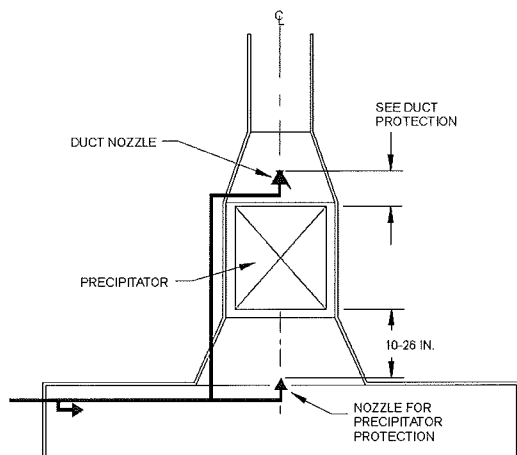


Figure 3-12.3. Nozzle Placement for Single Electrostatic Precipitator.

002934PC

2) Detector Placement

If an electrostatic precipitator is located at or near the base of an exhaust duct, one (1) detector must be located below the precipitator and an additional detector must be located above the precipitator in the duct opening. See **Figure 3-12.4**.

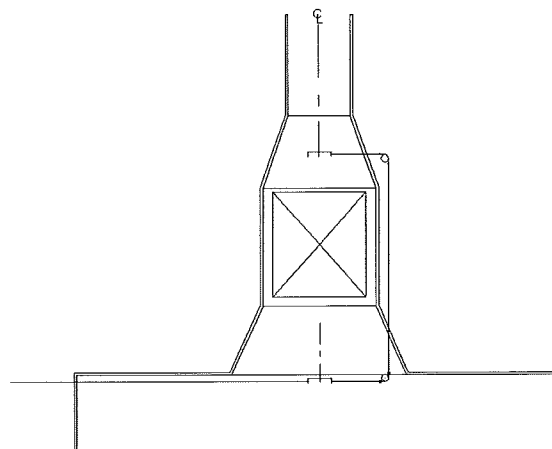
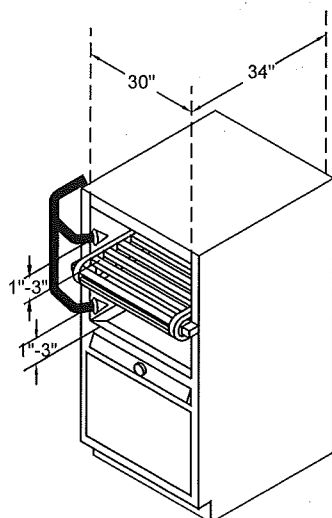


Figure 3-12.4. Detector Placement for Single Electrostatic Precipitator.

002935PC



**Figure 3-13. Model NL-UB Nozzle Placement,
Closed Top Chain Broiler.**

002936PC

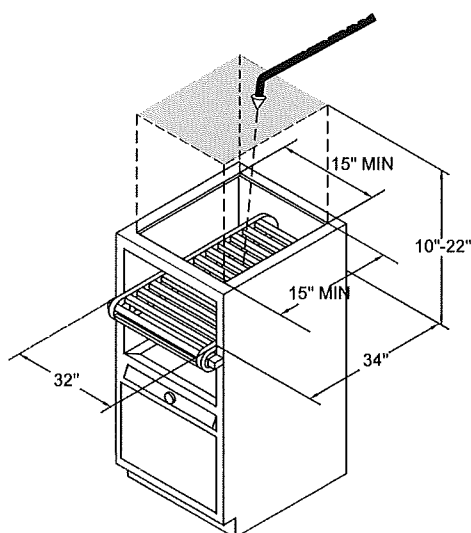
b. Open Top Chain Broiler Coverage.

The Model NL-A nozzle is a one (1) flow point nozzle that is used for open top chain broiler protection. The maximum area that can be protected by an NL-A nozzles is 32" x 34".

The nozzle must be located over the opening and aimed at the center of the protected zone. The nozzle must be mounted 10" to 22" above the cooking surface. See **Figure 3-14**.

NOTE

Nozzle shall be located anywhere in the shaded area and aimed at the center of the protected zone.



**Figure 3-14. Model NL-A Nozzle Placement,
Open Top Chain Broiler.**

002937PC

9. Wok Coverage

The Model NL-R nozzle is a one (1) flow point nozzle that is used for wok protection. A single NL-R nozzle can cover a single wok of 14" to 24" in diameter, and 3.875" to 7.625" in depth.

The nozzle must be mounted 40" to 50" above the cooking surface at a radius of 12" from the center of the wok, regardless of wok diameter. The nozzle must be aimed at the center of the protected zone. See **Figure 3-14.1**.

NOTE

Nozzle shall be located anywhere in the shaded area and aimed at the center of the protected zone.

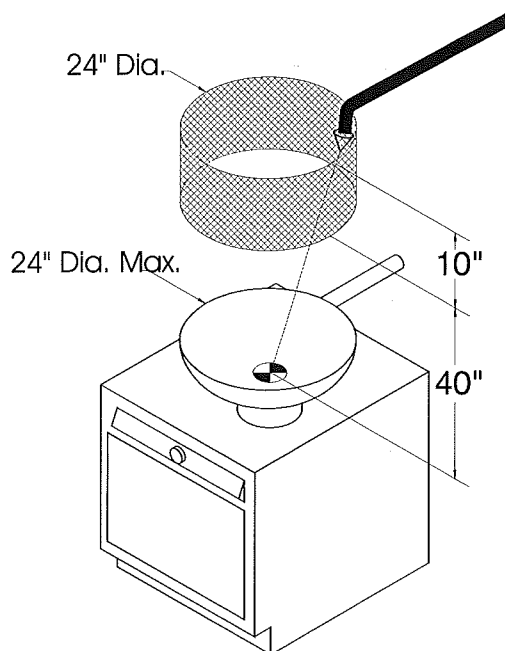


Figure 3-14.1. Model NL-R Placement, Wok.

002938PC

SECTION 2 CYLINDER SIZING

After determining the number and type of nozzles required to protect the duct, plenum, and cooking appliances, the total number of system flow points can be determined. The sum of all required nozzles' flow points is used to determine the size and quantity of cylinders required.

MAXIMUM CYLINDER FLOW POINTS	
Flow Points	Cylinder
8	PCL-240
13	PCL-350
20	PCL-550

For systems requiring more than twenty (20) flow points, any combination of cylinders can be used provided the total flow point requirements are met.

EXAMPLE

If a system requires twenty-six (26) flow points, the following combinations of cylinders can be used:

1. 1 x PCL-550 and 1 x PCL-240 (28 FP total)
2. 2 x PCL-350 (26 FP total)

NOTE

Cylinders cannot be manifolded together. Each cylinder must be piped separately.

SECTION 3 PIPING LIMITATIONS

Pyro-Chem Restaurant Fire Suppression System piping limitations are divided into two categories; Main Supply Line Piping Limitations and Branch Line Piping Limitations.

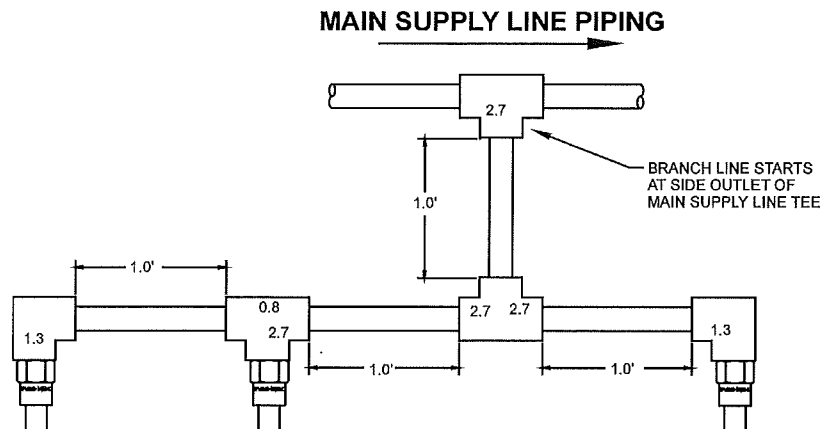
1. Main Supply Line Piping.

The main supply line is a run of pipe from the cylinder to the hazard area. In general, it is a straight run of pipe that runs through tees. Branch piping is connected to the side outlet of these tees.

The main supply line of the Pyro-Chem Restaurant Fire Suppression System utilizes either straight line or split piping to simplify system installation.

Straight line piping is distinguished by the fact that the main supply line is a straight run of pipe that flows through tees. When straight line piping is used, the main supply line cannot run into the branch of a tee.

Split piping is distinguished by the fact that the main supply line runs into the branch of the first tee, splitting the main supply line in two. When split piping is used, no branch piping can be connected to the main supply line before it is split. In split piping systems, the entire main supply line, including both sides of the split, cannot exceed the piping limitations outlined in this chapter. In addition, the equivalent lengths of the main supply line is not required to be balanced.



$$\begin{array}{rcl} \text{TOTAL LINEAR FEET} & & = 4.0' \\ \text{TOTAL FITTING EQUIVALENT} & & = 14.2' \end{array}$$

$$\text{TOTAL EQUIVALENT FEET} = 18.2'$$

Figure 3-15. Example of Equivalent Piping.

002939PC

2. Branch Line Piping.

Branch piping is used to connect the discharge nozzles to the main supply line. This piping is connected to the side outlet of main supply line tees. The last branch is connected to an elbow at the end of the main supply line. There are seven (7) types of branch piping:

1. One (1) Nozzle Duct Branch.
2. Two (2) Nozzle Duct Branch.
3. One (1) Nozzle Plenum Branch.
4. One (1) Nozzle Appliance Branch.
5. Two (2) Nozzle Appliance Branch.
6. Three (3) Nozzle Appliance Branch.
7. Four (4) Nozzle Range Branch.

UNDERSTANDING EQUIVALENT PIPING

Piping limitations in this chapter are given in both linear and equivalent lengths.

Linear piping is the actual length of straight pipe used on either the main supply line or a branch.

Equivalent piping is equal to the total linear pipe used on either the main supply line or a branch **plus** the equivalent length of any fittings used on either the main supply line or a branch. See **Figure 3-15**.

Equivalent Piping = (Linear Piping) +
(Total Equivalent Length of Fittings
Used)

All pipe fittings develop a pressure loss which can be equated to the loss through a specific length of straight pipe. This loss is the equivalent length of the fitting. See **Table 3-1**.

Pipe Size	45° Elbow	90° Elbow	Tee Flow Through	Tee Side Outlet	Union or Couplings
3/8"	0.6	1.3	0.8	2.7	0.3
1/2"	0.8	1.7	1.0	3.4	0.4

Table 3-1. Pipe Fitting Equivalent Lengths In Feet.

An example of the total equivalent piping calculation for a typical branch is illustrated by **Figure 3-15**.

NOTE

The only acceptable types of piping which can be used with the Pyro-Chem System are black pipe, stainless steel, or chrome plated pipe. Galvanized pipe cannot be used.

MAIN SUPPLY LINE PIPING LIMITATIONS

1. Model PCL-240.

Main supply line piping limitations for the PCL-240 are given by Table 3-2. The maximum length of main supply line between the first and last branch tee is 30 feet. Examples of acceptable piping configurations are shown in **Figure 3-16**.

Section	Pipe Dia.	Max Flow Points	Max Lengths Feet		Min Lengths Feet		Max Vert. Rise
			Linear	Equiv	Linear	Equiv	
Main Supply Line	3/8"	8	21	36	3	7	8'

Table 3-2. Model PCL-240. Main Supply Line Piping Limitations.

NOTE

For installations that require the use of the Model NL-F1.25 nozzle, the following additional restrictions apply before these nozzles:

1. Minimum length, linear: 5 feet
2. Minimum length, equivalent: 12 feet
3. Minimum system flow points: 3
4. Minimum branches (total): 3

2. Model PCL-350.

Main supply line piping limitations for the PCL-350 are given by Table 3-3. The maximum length of main supply line between the first and last branch tee is 30 feet. Examples of acceptable piping configurations are shown in **Figure 3-17**.

Section	Pipe Dia.	Max Flow Points	Max Lengths Feet		Min Lengths Feet		Max Vert. Rise
			Linear	Equiv	Linear	Equiv	
Main Supply Line	3/8" 1/2"	13	36	63	3	7	8'

Table 3-3. Model PCL-350. Main Supply Line Piping Limitations.

NOTE

For installations that require the use of the Model NL-F1.25 nozzle, the following additional restrictions apply before these nozzles:

1. Minimum length, linear: 5.5 feet
2. Minimum length, equivalent: 12 feet
3. Minimum system flow points: 3
4. Minimum branches (total): 3

3. Model PCL-550.

Main supply line piping limitations for the PCL-550 are given by Table 3-4. The maximum length of main supply line between the first and last branch tee is 35 feet. Examples of acceptable piping configurations are shown in **Figure 3-18**.

Section	Pipe Dia.	Max Flow Points	Max Lengths Feet		Min Lengths Feet		Max Vert. Rise
			Linear	Equiv	Linear	Equiv	
Main Supply Line	1/2"	20	45	80	3	7	8'

Table 3-4. Model PCL-550. Main Supply Line Piping Limitations.

NOTE

For installations that require the use of the Model NL-F1.25 nozzle, the following additional restrictions apply before these nozzles:

1. Minimum length, linear: 5.5 feet
2. Minimum length, equivalent: 12 feet
3. Minimum system flow points: 3
4. Minimum branches (total): 3

BRANCH PIPING LIMITATIONS

There are seven (7) types of branches used on the Pyro-Chem Restaurant Fire Suppression System:

1. One (1) Nozzle Duct Branch.
2. Two (2) Nozzle Duct Branch.
3. One (1) Nozzle Plenum Branch.
4. One (1) Nozzle Appliance Branch.
5. Two (2) Nozzle Appliance Branch.
6. Three (3) Nozzle Appliance Branch.
7. Four (4) Nozzle Range Branch.

NOTE: A range branch is any branch that contains NL-F1.25 nozzles only. Any branch that contains NL-F1.25 nozzles in combination with any other nozzle(s) is considered an appliance branch.

When using the PCL-240, the total of all duct, plenum, appliance, and range branch piping cannot exceed 25 linear feet and 55 equivalent feet.

When using the PCL-350, the total of all duct, plenum, appliance, and range branch piping cannot exceed 35 linear feet and 100 equivalent feet.

When using the PCL-550, the total of all duct, plenum, appliance, and range branch piping cannot exceed 45 linear feet and 125 equivalent feet.

Branch piping limitations are applicable to all cylinder sizes (i.e., PCL-240, PCL-350, and PCL-550). All branch piping must be 3/8" diameter black, chrome plated, or stainless steel pipe.

1. One Nozzle Duct Branch Piping Limitations.

The one nozzle duct branch is a run of 3/8" pipe which connects the main supply line to a single duct nozzle. A one nozzle duct branch can support the following combinations of nozzles:

1. 1 x Model NL-P Nozzle.
2. 1 x Model NL-D2 Nozzle.
3. 1 x Model NL-D3 Nozzle.

One nozzle duct branch piping limitations are given by **Table 3-5**.

Section	Pipe Dia.	Max Flow Points	Max Lengths Feet		Min Lengths Feet		Max Vert. Rise
			Linear	Equiv	Linear	Equiv	
1 Nozzle Duct Branch	3/8"	3	6	12	0	0	4'

Table 3-5. Duct Branch Piping Limitations.

2. Two Nozzle Duct Branch Piping Limitations.

The two nozzle duct branch is a run of 3/8" pipe which connects the main supply line to two duct nozzles. A two nozzle duct branch can support the following combinations of nozzles:

1. 2 x Model NL-P Nozzle.
2. 2 x Model NL-D3 Nozzle.

Two nozzle duct branch piping limitations are given by **Table 3-5.1**.

Section	Pipe Dia.	Max Flow Points	Max Lengths Feet		Min Lengths Feet		Max Vert. Rise
			Linear	Equiv	Linear	Equiv	
2 Nozzle Duct Branch	3/8"	6	8	22	0	0	4'

Table 3-5.1. Duct Branch Piping Limitations.

3. One Nozzle Plenum Branch Piping Limitations.

The one nozzle plenum branch is a run of 3/8" pipe which connects the main supply line to a plenum nozzle. A single plenum branch can support only one flow point. Plenum branch piping limitations are given by **Table 3-6**.

Section	Pipe Dia.	Max Flow Points	Max Lengths Feet		Min Lengths Feet		Max Vert. Rise
			Linear	Equiv	Linear	Equiv	
1 Nozzle Plenum Branch	3/8"	1	4	10	0	0	2'

Table 3-6. Plenum Branch Piping Limitations.

4. One Nozzle Appliance Branch Piping Limitations.

The one nozzle appliance branch is a run of 3/8" pipe which connects the main supply line to a single appliance nozzle. A one nozzle appliance branch can support a maximum of two (2) flow points. One nozzle appliance branch piping limitations are given by **Table 3-7**.

Section	Pipe Dia.	Max Flow Points	Max Lengths Feet		Min Lengths Feet		Max Vert. Rise
			Linear	Equiv	Linear	Equiv	
1 Nozzle Appliance Branch	3/8"	2	6	12	0	0	0'

Table 3-7. One Nozzle Appliance Branch Piping Limitations.

5. Two Nozzle Appliance Branch Piping Limitations.

The two nozzle appliance branch is a run of 3/8" pipe which connects the main supply line to two appliance nozzles. A two nozzle appliance branch can support a maximum of four (4) flow points. Two nozzle appliance branch piping limitations are given by **Table 3-7.1.**

Section	Pipe Dia.	Max Flow Points	Max Lengths Feet		Min Lengths Feet		Max Vert. Rise
			Linear	Equiv	Linear	Equiv	
2 Nozzle Appliance Branch	3/8"	4	8	22	0	0	0'

Table 3-7.1. Two Nozzle Appliance Branch Piping Limitations

6. Three Nozzle Appliance Branch Piping Limitations

The three nozzle appliance branch is a run of 3/8" pipe which connects the main supply line to three appliance nozzles. A three nozzle appliance branch can support a maximum of five (5) flow points. Three nozzle appliance branch piping limitations are given by **Table 3-7.2.**

Section	Pipe Dia.	Max Flow Points	Max Lengths Feet		Min Lengths Feet		Max Vert. Rise
			Linear	Equiv	Linear	Equiv	
3 Nozzle Appliance Branch	3/8"	5	10	28	0	0	0'

Table 3-7.2. Three Nozzle Appliance Branch Piping Limitations

7. Four Nozzle Range Branch Piping Limitations

NOTE

These limitations apply to branches that utilize four (4) model NL-F1.25 nozzles. No other types of nozzles, or combinations of nozzles, may be used on a four nozzle branch.

The four nozzle range branch is a run of 3/8" pipe which connects the main supply line to four NL-F1.25 range nozzles. A four nozzle range branch can support a maximum of five (5) flow points. The four nozzle range branch piping limitations are given by **Table 3-8.**

Section	Pipe Dia.	Max Flow Points	Max Lengths Feet		Min Lengths Feet		Max Vert. Rise
			Linear	Equiv	Linear	Equiv	
4 Nozzle Range Branch	3/8"	5	10	31	0	0	0'

Table 3-8. Four Nozzle Range Branch Piping Limitations

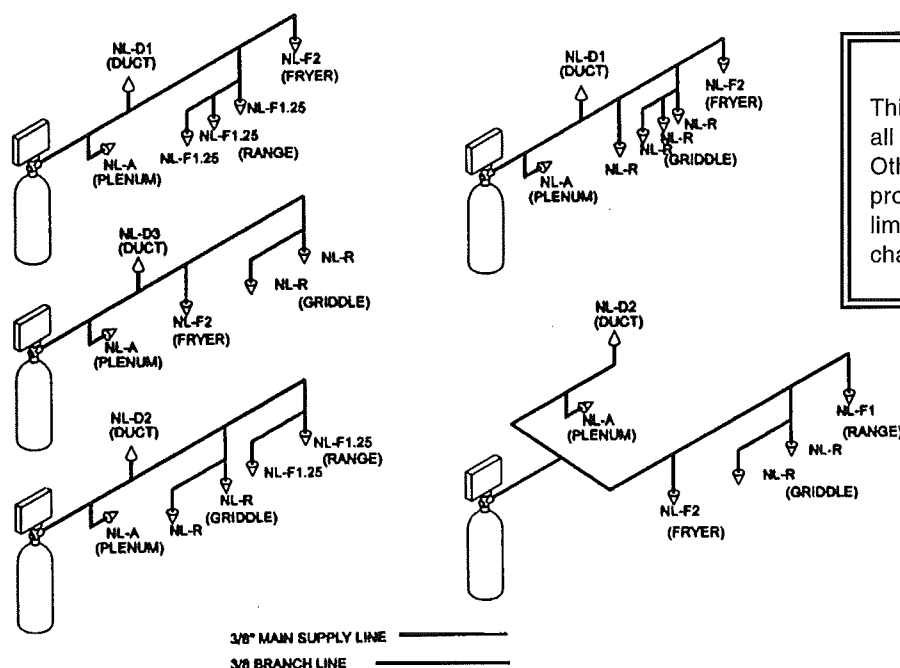


Figure 3-16. Model PCL-240. Examples Of Acceptable Piping Configurations.

002940PC

NOTE

This is not a complete list of all possible configurations. Others will be acceptable provided they conform to the limitations shown in this chapter.

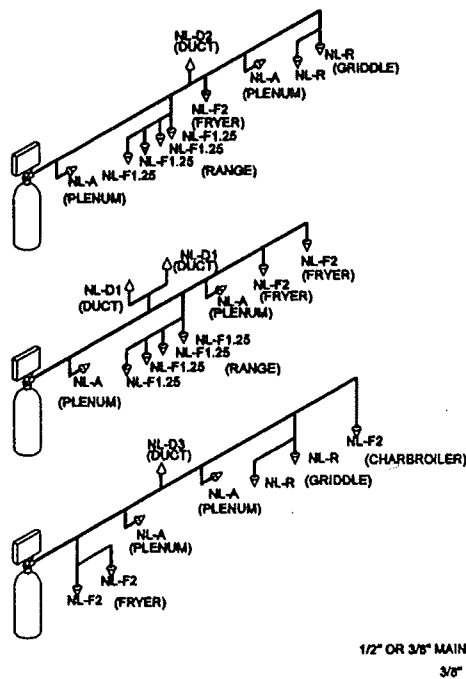


Figure 3-17. Model PCL-350. Examples Of Acceptable Piping Configurations.

002941PC

NOTE

This is not a complete list of all possible configurations. Others will be acceptable provided they conform to the limitations shown in this chapter.

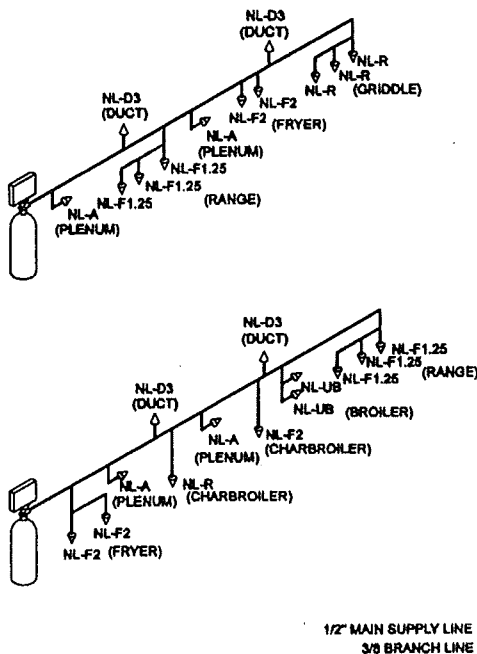
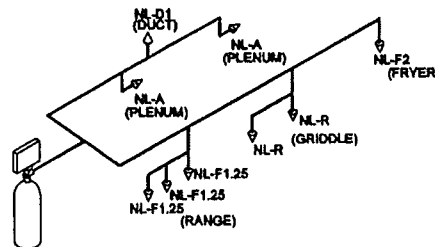


Figure 3-18. Model PCL-550. Examples Of Acceptable Piping Configurations.

002942PC

NOTE

This is not a complete list of all possible configurations. Others will be acceptable provided they conform to the limitations shown in this chapter.

SECTION 4

DETECTOR PLACEMENT

Detectors are required over cooking appliances and in the duct(s) of protected ventilation hoods. Detectors shall be located in the plenum area of the ventilation hood.

1. Exhaust Duct(s).

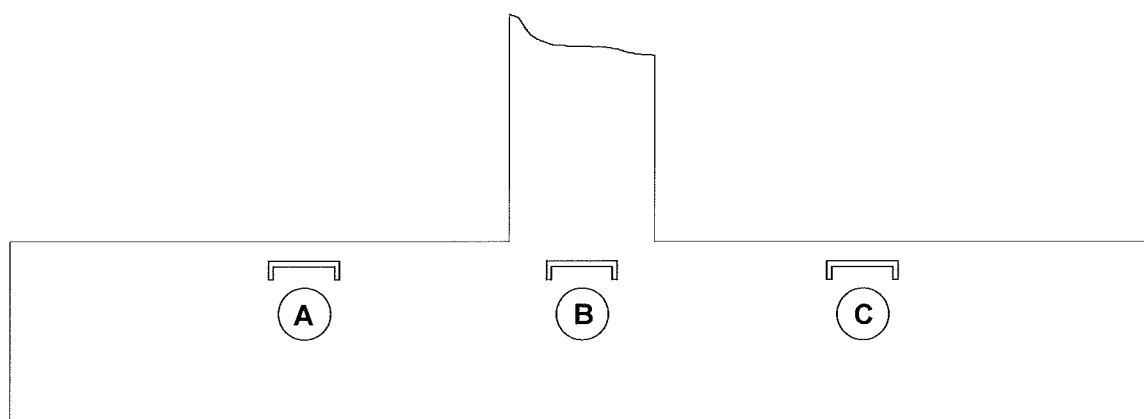
Each exhaust duct must have at least one (1) detector installed in the center of the duct entrance or at a maximum of 12 feet into the duct, centered. See **Figure 3-19**.

2. Cooking Appliance(s).

Each cooking appliance with a continuous cooking surface not exceeding 48" x 48" shall be protected by one (1) detector. Cooking appliances with a continuous cooking surface exceeding 48" x 48" shall be protected by one (1) detector

per 48" x 48" cooking area. Detectors used for cooking appliances must be located within the perimeter of the protected appliance toward the exhaust duct side of the appliance. The detector should be located in the air stream of the appliance to enhance system response time.

If a cooking appliance is located under a duct opening where a detector has been mounted, it is not necessary to utilize an additional detector provided the duct detector is not more than 12" into the duct opening. If two (2) appliances are located under a duct opening where a detector has been mounted, it is not necessary to utilize an additional detector provided the duct detector is not more than 12" into the duct opening. See **Figure 3-19**.



APPLIANCE COVERED BY DETECTOR A	APPLIANCE COVERED BY DETECTOR B	APPLIANCE COVERED BY DETECTOR B	APPLIANCE COVERED BY DETECTOR C
---	---	---	---

Figure 3-19. Proper Detector Placement.

002943PC

Chapter 3 – System Design
Page 3-14

NOTES:

CHAPTER IV SYSTEM INSTALLATION

GENERAL

This chapter will detail the basic information necessary for proper installation of the Pyro-Chem Restaurant Fire Suppression System. However, before attempting any installation it is necessary to attend a Factory Certification Training Class and become Certified to install the Pyro-Chem Restaurant Fire Suppression System. Because it is impossible to completely understand every aspect of an intricate pre-engineered system simply by reading the Technical Manual, Pyro-Chem will not be responsible for system installations or maintenance performed by any non-Certified person(s).

Pipe and fittings for the discharge piping, conduit (EMT), pipe straps, pipe hangers, mounting bolts, and other miscellaneous equipment are not furnished as part of the Pyro-Chem Restaurant Fire Suppression System. These items must be furnished by the installer.

Before attempting any installation, unpack the entire system and check that all necessary parts are on hand. Inspect parts for damage. Verify that cylinder pressure is within the acceptable range as shown on the gauge.

CYLINDER INSTALLATION

The cylinder and valve assembly is shipped with an anti-recoil plug in the valve discharge port.

CAUTION

The anti-recoil plug must remain in the valve discharge port until the discharge piping is connected to the valve.

The cylinder must be mounted vertically with the discharge port facing either left or right. The Models PCL-240 and PCL-350 cylinders must be mounted using a Model MB-15 Mounting Bracket Kit. The Model PCL-550 cylinder must be mounted using a Model MB-1 Mounting Bracket Kit.

The bracket must be securely anchored to the wall using bolts or lag screws. The wall to which the bracket is attached must be sufficiently strong to support the cylinder. The bracket should never be fastened to dry wall or similar material. If this type of wall is encountered, studs must be located and the bracket fastened to them. See **Figure 4-1**.

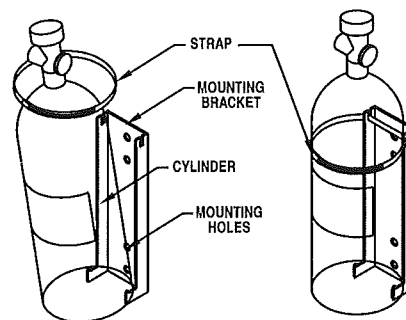


Figure 4-1. Cylinder and Mounting Bracket Installation.

002945PC

CONTROL HEAD INSTALLATION

1. Single Cylinder Installations.

For single cylinder system installations the Model MCH/ECH Control Head can be installed directly onto the cylinder valve. When the control head is properly aligned in the desired position, tighten the knurled locking ring to secure the assembly. See **Figure 4-2**.

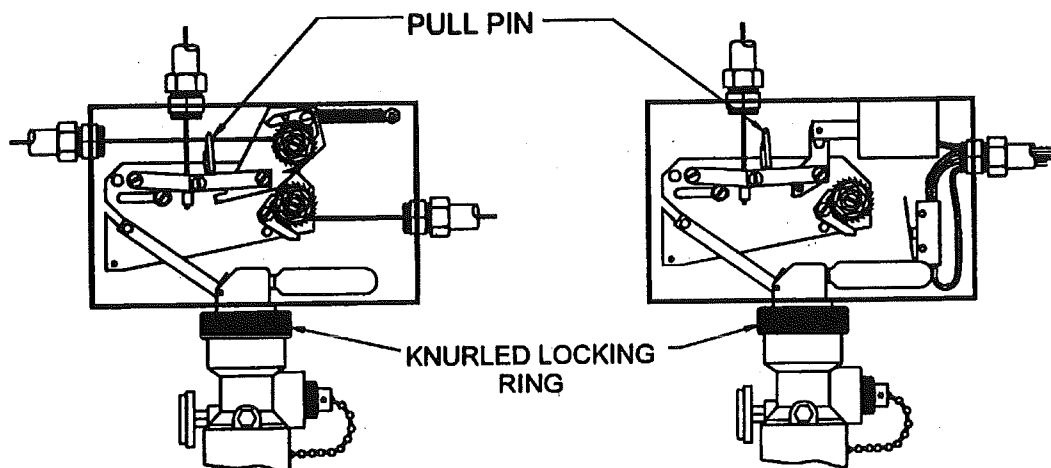


Figure 4-2. Single Cylinder Installation Using Model ECH Control Head.

002872PC

2. Multiple Cylinder Installations.

A. Multiple Cylinder Actuation Using MCH/ECH Control Head.

The Model MCH/ECH Control Head can be used to pneumatically actuate a maximum of three (3) agent cylinders. When a control head is used for multiple cylinder actuation, it cannot be mounted directly onto a cylinder valve. The control head must be installed remotely using a Model MB-P2 Control Head Mounting Bracket. The bracket must be anchored to the wall using bolts or lag screws.

In order to actuate the agent cylinder(s) from a control head, a 1/4" NPT x 45° 1/4" flare type fitting (conforming to SAE J513c) must be screwed into the base of the control head actuator. Pneumatic tubing is then used to connect the control head to the valve cap assembly of each agent cylinder valve. See **Figure 4-3**.

NOTE

Pneumatic tubing used for remote cylinder actuation shall have an outside diameter of 1/4" with a minimum wall thickness of 1/32". This is commonly known as refrigeration-type copper tubing. All tubing fittings shall be of the 1/4", 45° flare type conforming to SAE J513c.

Compression type fittings are not acceptable.

A single Model MCH/ECH Control Head can actuate:

1. One (1) or two (2) agent cylinders with a maximum of eight (8) feet of pneumatic tubing.
2. Three (3) agent cylinders with a maximum of six (6) feet of pneumatic tubing.

B. Multiple Cylinder Actuation Using Model PAC-10 or PAC-200 Pneumatic Actuation Cylinder.

The Model PAC-10 or PAC-200 Pneumatic Actuation Cylinder must be used if more than three (3) agent cylinders require simultaneous actuation. The Model PAC-10/200 must be used in conjunction with a Model MCH/ECH Control Head. The control head is mounted on the Model PAC-10/200 valve assembly.

The Model PAC-10/200 is shipped complete with a mounting bracket. The cylinder must be mounted vertically with the nameplate facing out. The bracket must be securely anchored to the wall using bolts or lag screws. The wall to which the bracket is attached must be sufficiently strong to support the pneumatic cylinder. The bracket should never be fastened to dry wall or similar material. If this type of wall is encountered, studs must be located and the bracket fastened to them. See **Figure 4-4**.

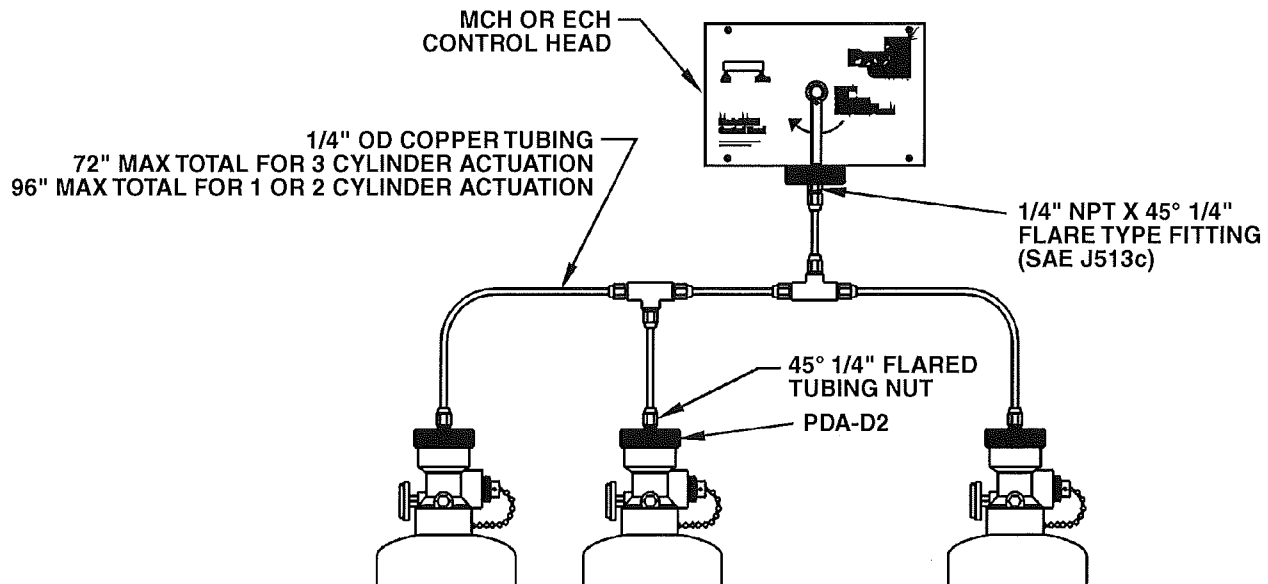


Figure 4-3. Multiple Cylinder Actuation Using Model MCH/ECH Control Head.

002673PC

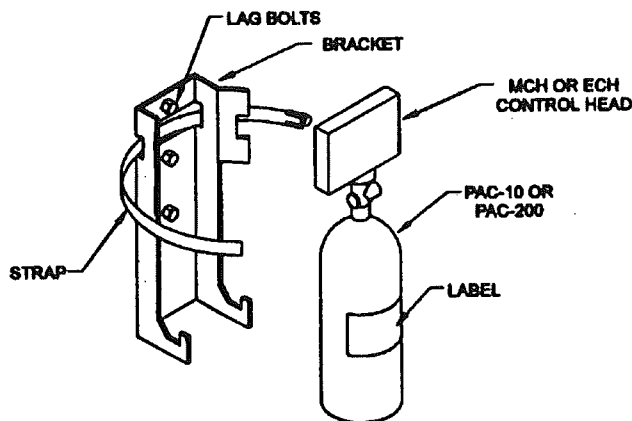


Figure 4-4. Model PAC-10/200 Pneumatic Cylinder Installation.

002874PC

NOTE

Pneumatic tubing used for remote cylinder actuation shall have an outside diameter of 1/4" with a minimum wall thickness of 1/32". This is commonly known as refrigeration-type copper tubing. All tubing fittings shall be of the 1/4", 45° flare type conforming to SAE J513c.

Compression type fittings are not acceptable.

The Model PAC-10 pneumatic cylinder can actuate a maximum of ten (10) agent cylinders with a maximum of 100 feet of pneumatic tubing.

The Model PAC-200 pneumatic cylinder can actuate a maximum of twenty (20) cylinders with a maximum of 200 feet of pneumatic tubing.

In order to actuate the agent cylinders from a Model PAC-10/200 Pneumatic Actuation Cylinder, a 3/4" NPT x 1/4" NPT bushing must be screwed into the pneumatic cylinder's discharge port. A 1/4" NPT x 45° 1/4" flare type fitting (conforming to SAE J513c) must then be screwed into this bushing. Pneumatic tubing is then used to connect the PAC-10/200 pneumatic cylinder to the valve cap assembly of each agent cylinder valve. See **Figure 4-5**.

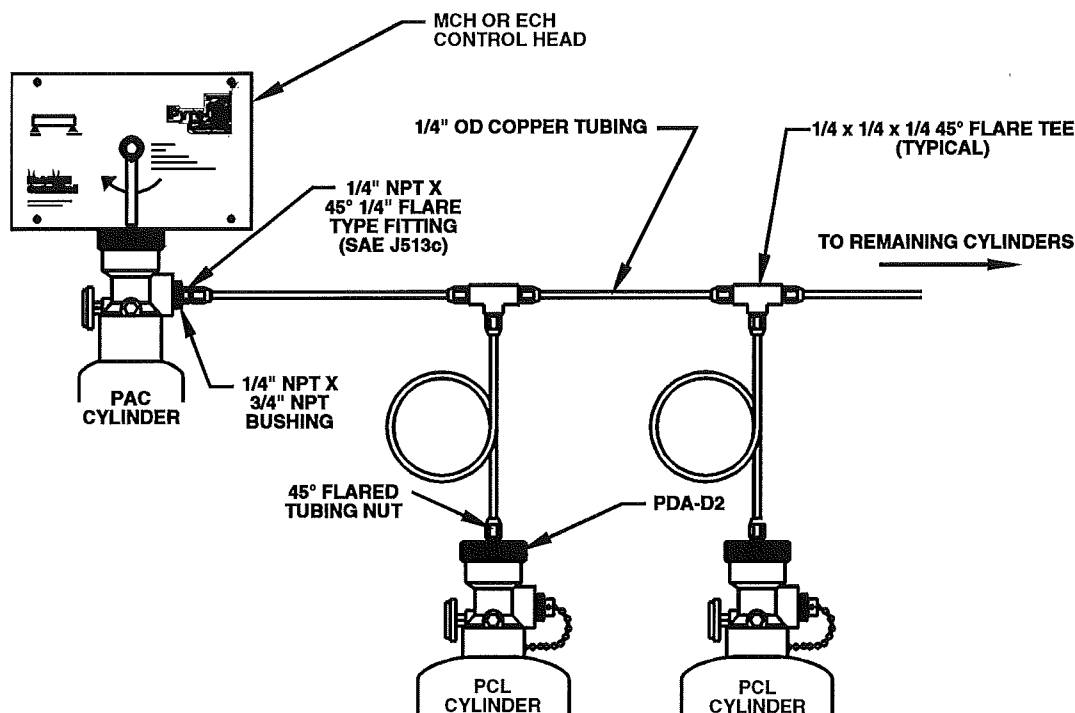


Figure 4-3. Multiple Cylinder Actuation Using Model MCH/ECH Control Head.

002875PC

FUSIBLE LINK DETECTOR INSTALLATION

Fusible links are always used in conjunction with the Model MCH Mechanical Control Head. After mounting the cylinder and control head, the fusible link line can be installed. The first step to installing the fusible link line is to install the detector bracket(s). These brackets must be installed in the plenum area of the ventilation hood over all protected appliances and in each duct. See Chapter III for detector placement guidelines.

Note: Only ML-style Fusible Links can be used.

Connect the fusible link brackets together using 1/2" conduit and the conduit connectors supplied in the detector kit (Model FLK-1/1A). A Pyro-Chem corner pulley must be used whenever a change in conduit direction is necessary. The conduit is connected to the control head through a knockout in the upper left-side corner.

In general, fusible links centered in the detector brackets are connected in series using 3/64" or 1/16" diameter stainless steel cable. The spring plate in the control head maintains tension on this series of fusible links. If the tension is released for any reason (i.e., a fusible link separates), the control head will operate and actuate the system. Maximum limitations for the fusible link detection line are as follows:

Fusible links can be installed with or without fusible link hangers (see Chapter II for description).

Fusible Link Line Limitations

Maximum # of detectors:	15
Maximum length of cable:	100 feet
Maximum # of pulleys:	20

1. Fusible Link Installation Without Hangers.

Begin installing links at the terminal bracket. The link is connected to the far side of the terminal bracket using an "S" hook. The "S" hook must be crimped closed after the link is installed. A tight loop is then made in the cable and secured by the crimp provided. This loop is connected to the other side of the terminal link (see Figure 4-6) and the cable fed through the conduit to the next bracket. The cable proceeding from the terminal link will be used to connect the series links (see Figure 4-7). Series links must be centered in their detector brackets.

After the last link in the series is connected, the cable should be fed through the conduit back to the control head. Thread the cable through the hole in the fusible link ratchet wheel. The line must then be crimped, and the crimp positioned inside the center of the ratchet wheel.

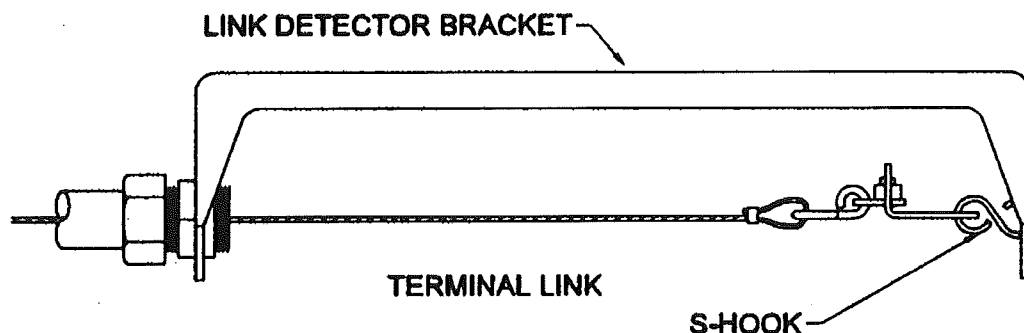


Figure 4-6. Terminal Link Installation.

002849aPC

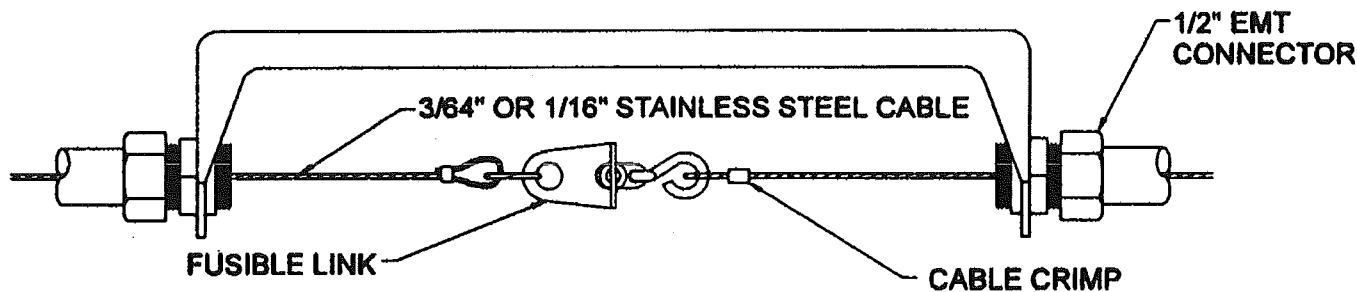


Figure 4-7. Series Link Installation.

002849bPC

NOTE

Crimps must always be used in conjunction with two (2) cable lengths. Loops are the accepted method of connecting the cable to mechanical components. The crimp must never be used on a single cable.

The fusible link line can now be put into a set position by applying tension to the fusible link line. This is accomplished by using a 3/4" socket on the fusible link line ratchet wheel. The ratchet wheel will be ratcheted in a clockwise direction until the spring plate makes contact with the top of the control head box. The fusible link line is now in a set position. See **Figure 4-8**.

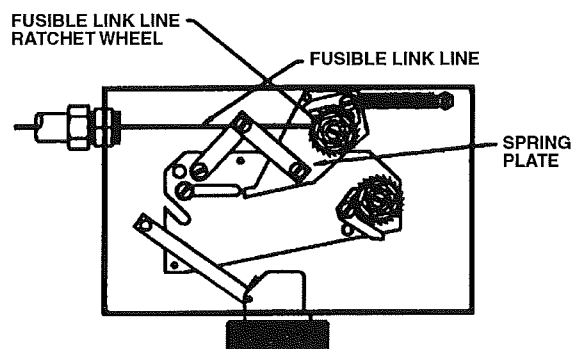


Figure 4-8. Fusible Link Line Termination.
002876PC

2. Fusible Link Installation Using Model FLH-1 Fusible Link Hangers.

Beginning at the control head, feed the stainless steel cable through the conduit and brackets to the terminal bracket in one continuous length. Allow approximately two and one-half (2.5) inches of slack at each bracket for the installation of the Fusible Link Hangers. At the terminal link, a tight loop is made in the cable and secured by the crimp provided. The cable is attached to the far side of the terminal bracket using an "S" hook. The "S" hook must be crimped closed after the cable is installed. See **Figure 4-9**.

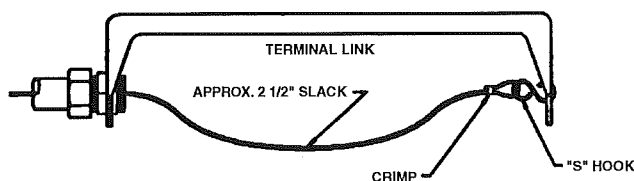


Figure 4.9. Terminal Bracket Connection.
002877PC

Begin installing the Fusible Link Hangers at the terminal bracket and work toward the control head. Loop the cable through the oval opening in the hanger and hook the fusible link on the loop. See **Figure 4-10**.

Note: Only ML-style Fusible Links can be used.

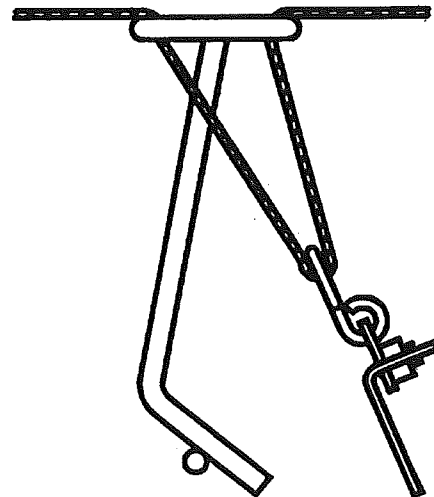


Figure 4-10. Fusible Link Connection.
002878PC

Hook the bottom of the link onto the bottom leg of the hanger. See **Figure 4-11**.

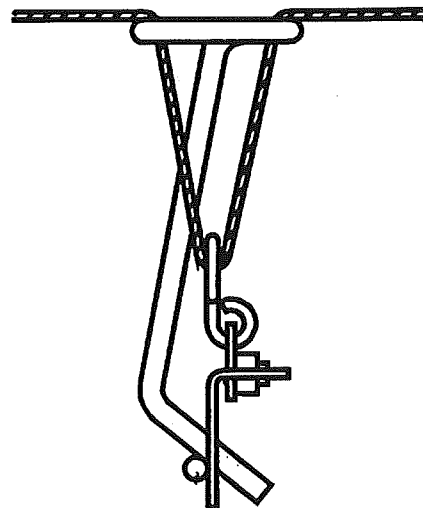


Figure 4-11. Fusible Link/Hanger Connection.
002879PC

Center the hanger/link in the fusible link bracket by sliding it along the link line. This is easily accomplished before any tension is applied to the link line. Repeat this procedure for all fusible links.

After the last hanger/link in the series is connected, the cable should be fed through the hole in the fusible link ratchet wheel. The line must then be crimped, and the crimp positioned inside the center of the ratchet wheel.

NOTE

Crimps must always be used in conjunction with two (2) cable lengths. Loops are the accepted method of connecting the cable to mechanical components. The crimp must never be used on a single cable.

The fusible link line can now be put into a set position by applying tension to the fusible link line. This is accomplished by using a 3/4" socket on the fusible link line ratchet wheel. The ratchet wheel will be ratcheted in a clockwise direction until the spring plate makes contact with the top of the control head box. The fusible link line is now in a set position. See **Figure 4-8**. Check to ensure that the fusible link hanger(s) remain centered in the bracket after the fusible link line is set. See **Figure 4-12**.

THERMAL DETECTOR INSTALLATION

Thermal detectors are always used in conjunction with the Model ECH Electrical Control Head. After mounting the cylinder and control head, the thermal detector(s) can be installed. Install the thermal detector(s) in the plenum area of the ventilation hood over all protected appliances and in each duct. See **Chapter III** for detector placement guidelines. Follow the instructions included with the detector for proper detector mounting procedures.

SETTING THE CONTROL HEAD

1. Model MCH Mechanical Control Head.

Once the fusible link line is set, the control head can be placed in the set position. To set the control head, the slide plate is moved from right to left, ensuring the bolt extending from the cam arm is in the slot provided in the slide plate. Continue moving the slide plate to the left until the latching arm is in the locked position. Insert the pull pin into the hole in the slide plate above the latching arm. This will lock the control head in the set position, eliminating accidental actuation during the rest of the installation procedure. See **Figure 4-13**.

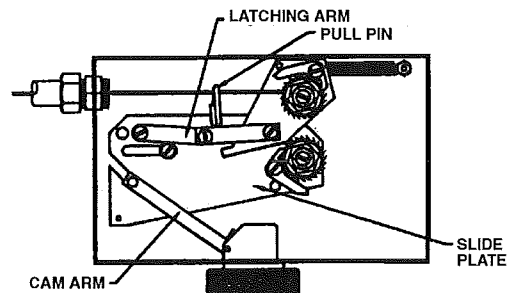


Figure 4-13. Control Head In Set Position.

002880PC

2. Model ECH Electrical Control Head.

Once the thermal detectors have been installed, the control head can be placed in the set position. To set the control head, the slide plate is moved from right to left, ensuring the bolt extending from the cam arm is in the slot provided in the slide plate. Continue moving the slide plate to the left until the latching arm is in the locked position. Insert the pull pin

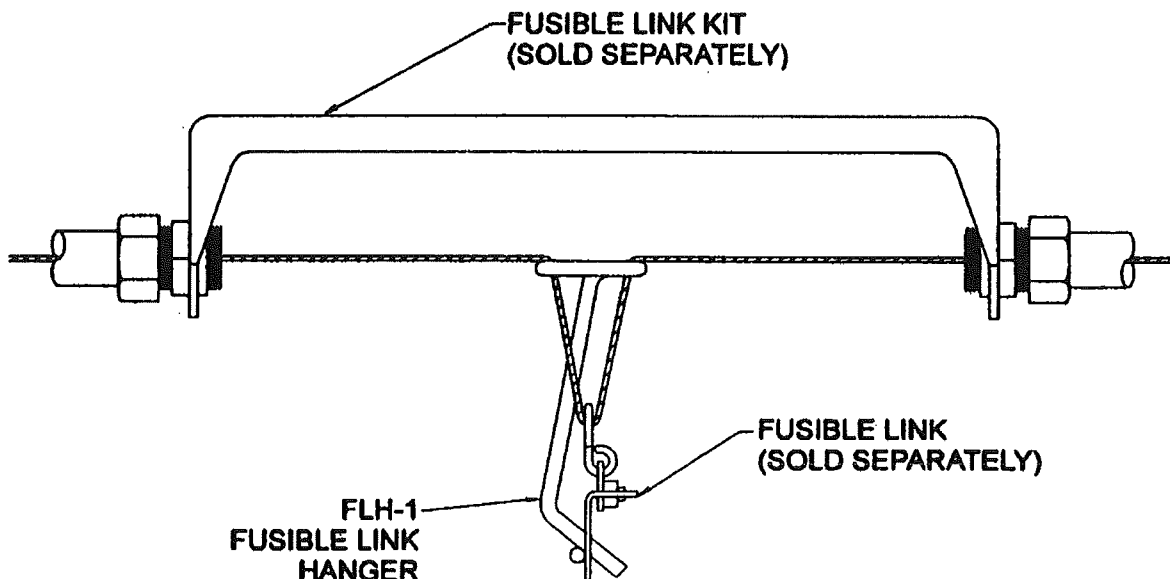


Figure 4-12. Fusible Link/Hanger In Set Position.

002849bPC

into the hole in the slide plate above the latching arm. This will lock the control head in the set position, eliminating accidental actuation during the rest of the installation procedure.

Once the Model ECH Electrical Control Head is in the set position, it can be connected to the detection/actuation circuit.

NOTE

No electrical connections shall be made inside the control head. All electrical wiring shall exit the control head through the knock-out in the upper right-hand corner. All electrical connections must be made in an approved electrical box.

Connect one of the black wires on the solenoid in the control head to the black wire of the Model MS-SPDT or MS-DPDT Miniature Switch. The blue wire from the miniature switch is then connected to one side of the first thermal detector in series. Connect the other side of the first thermal detector in series and the remaining black wire on the solenoid in the control head to the appropriate power source after installing the Model SM-24/120 Solenoid Monitor.

NOTE

A Model SM-24/120 Solenoid Monitor must always be used with an Electrical Control Head to supervise the actuation/detection circuit.

Where electrical detection and/or actuation is provided, supervision shall be provided in accordance with NFPA-17A.

Alarms and indicators along with a supervised backup power source shall be provided in accordance with NFPA 72, The National Fire Alarm Code.

Electrical wiring and equipment shall be installed in accordance with NFPA 70, National Electric Code or the requirements of the authority having jurisdiction.

The Model ECH-24 Electrical Control Head requires a UL Listed 24VDC power supply with a minimum 2A rating. The Model ECH-120 Electrical Control Head requires a 1A, 120VAC power supply.

SOLENOID MONITOR INSTALLATION

1. Solenoid Monitor Installation in Detection Circuit.

After installing the thermal detectors and the control head, the Model SM-120/24 Solenoid Monitor can be installed. The Solenoid Monitor is connected to the wires leading from the last thermal detector. It should be mounted in a location where it can be readily observed.

The Solenoid Monitor is an end-of-line device that supervises the actuation/detection circuit. It is comprised of a push-type switch with a built-in indicator light, a plug-type relay, a relay socket, and a cover plate. The light, when illuminated, indicates that the detection/actuation circuit is in the normal condition. The Solenoid Monitor also provides two sets of dry contacts. The Solenoid Monitor's cover plate is used to mount the Solenoid Monitor in a standard 6" x 4" x 3" deep electrical box. See **Figure 4-14**.

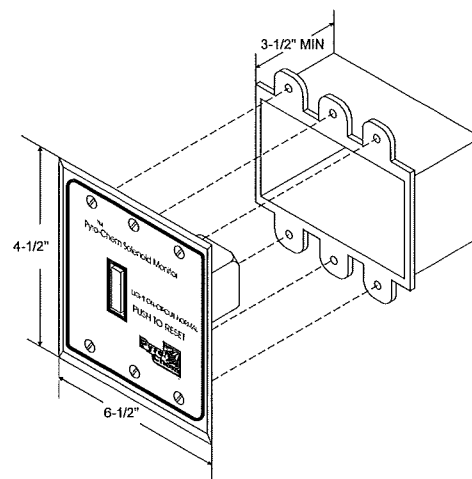


Figure 4-14. Solenoid Monitor Installation.

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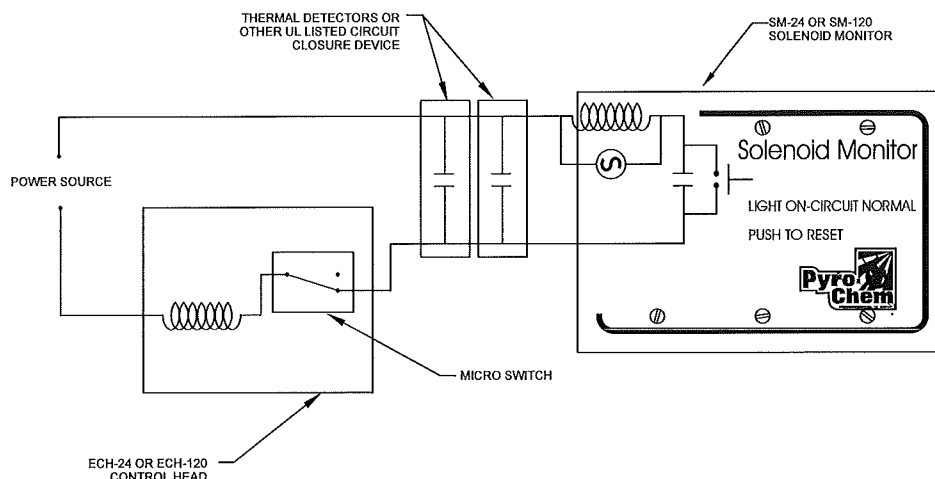


Figure 4-14.1. Wiring Diagram, Solenoid.

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All wire for circuits using the Model SM-24 shall be 18 gage minimum, or as required by local code. All wire for circuits using the Model SM-120 shall be 14 gage minimum, or as required by local code. The basic wiring diagram for both the Model SM-24 and Model SM-120 is shown in **Figure 4-14.1**.

After the Solenoid Monitor has been installed, the detection/actuation circuit can be connected to the appropriate power source and energized. To energize the detector/actuation circuit, depress the switch on the Solenoid Monitor. The light will illuminate to indicate that the circuit is properly installed. If the light fails to illuminate, the wiring must be checked.

2. Solenoid Monitor When Used As A Reset Relay

The Model SM-24/120 can be used as a reset relay when required. A reset relay is required whenever an electrical gas shut-off valve is used in conjunction with the Pyro-Chem Restaurant Fire Suppression System. For typical wiring connections, see **Figure 4-15**.

REMOTE PULL STATION INSTALLATION

The Model RPS-M Remote Mechanical Pull Station is used for remote mechanical actuation of all system releasing devices. It is to be located near an exit in the path of egress from the hazard area no more than five feet above the floor.

NOTE

A Model RPS-M Remote Mechanical Pull Station must be used for manual activation of a Model EN-MCU or a Model NMCH releasing device.

The Pull Station can be surface mounted or flush mounted. For flush mounting a RACO #232 4" deep electrical box or equivalent must be used (dealer supplied). It is connected to the releasing device using 3/64" or 1/16" diameter stainless steel cable. The cable enters the pull station box through the center hole in the bottom, top, either side, or the center back hole. The cable enters the control head through the

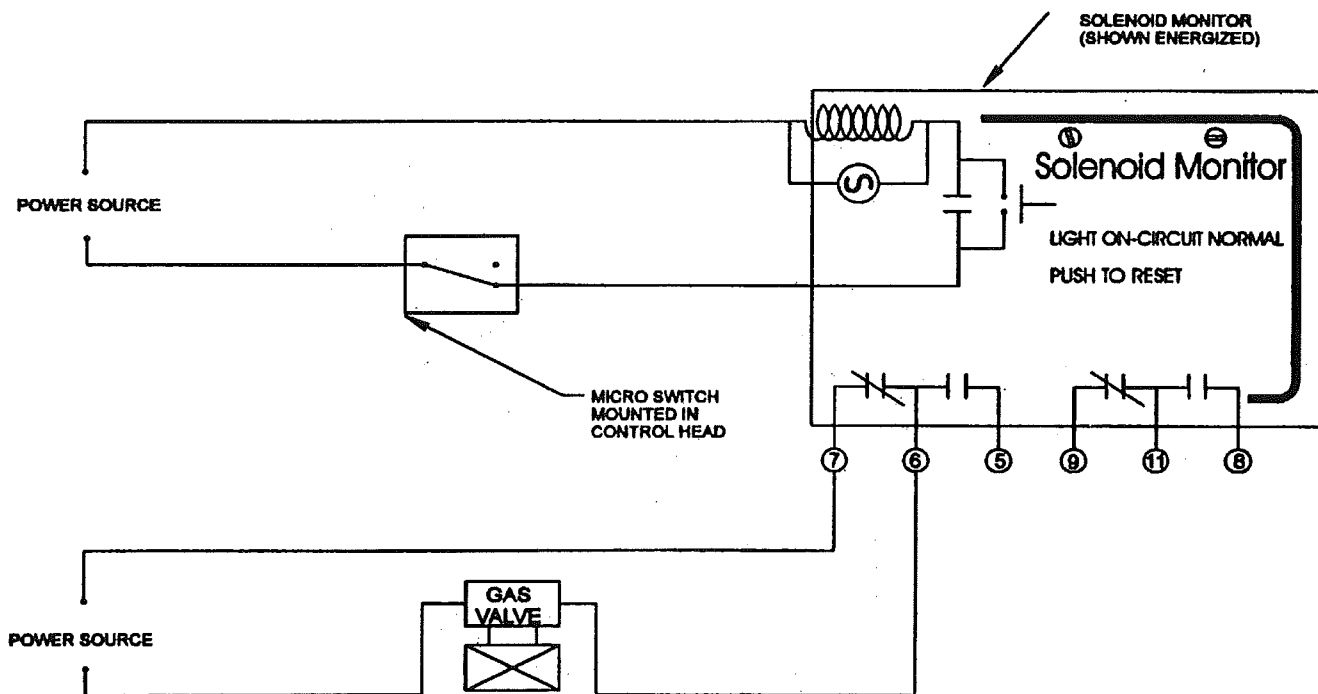


Figure 4-15. Solenoid Monitor Wiring With Electrical Gas Shutoff Valve.

002882PC

top-center knockout. The cable must be enclosed in 1/2" conduit with a Pyro-Chem corner pulley at each change in conduit direction. Maximum limitations for the Model RPS-M Remote Mechanical Pull Station are as follows:

Model RPS-M Cable Run Limitations

Maximum length of cable:	100 feet
Maximum # of pulleys (3/64):	20
Maximum # of pulleys (1/16):	17

After mounting the pull station box and conduit, feed the stainless steel cable from the releasing device, through the conduit, and into the pull station box. Feed the cable through the bushing and through the hole provided in the pull handle. Loop the cable through the pull handle and secure it with the crimp provided (see **Figure 4-16**).

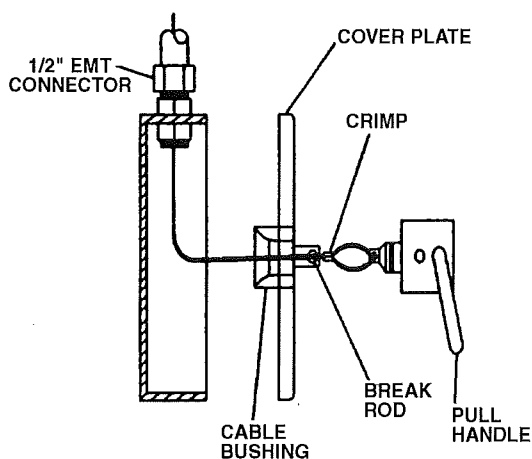


Figure 4-16. Model RPS-M Remote Pull Station Installation.

002884PC

Cut and thread the cable through the hole in the latching arm of the control head and pull the cable tight. Crimp the cable twelve (12) inches below the latching arm.

NOTE

Crimps must always be used in conjunction with two (2) cable lengths. Loops are the accepted method of connecting the cable to mechanical components. **The crimp must never be used on a single cable.**

Pull the pull handle until the crimp touches the latching arm. See **Figure 4-17**. Coil the excess cable in the pull box and attach the cover plate with the four screws provided. Insert the pull handle into the cover plate and insert the plastic break rod.

GAS SHUT-OFF VALVE INSTALLATION

1. Mechanical Gas Shut-Off Valve Installation.

The Model MCH/ECH Control Head is used to operate the mechanical gas shut-off valve. This valve is located in the fuel gas supply line to the cooking appliance(s). The valve body has an arrow which indicates direction of gas flow through the valve. The gas shut-off valve is spring loaded and requires five pounds of force to hold it open. This force is supplied by a 3/64" or 1/16" diameter stainless steel cable that is connected to the control head.

After the valve is installed in the gas line, 1/2" conduit must be run from the top center knockout of the gas valve box to the lower right-hand knockout in the control head. A Pyro-Chem corner pulley is used wherever a change in conduit direction is required.

Gas Valve Cable Run Limitations

Maximum length of cable:	50 feet
Maximum # of pulleys:	15

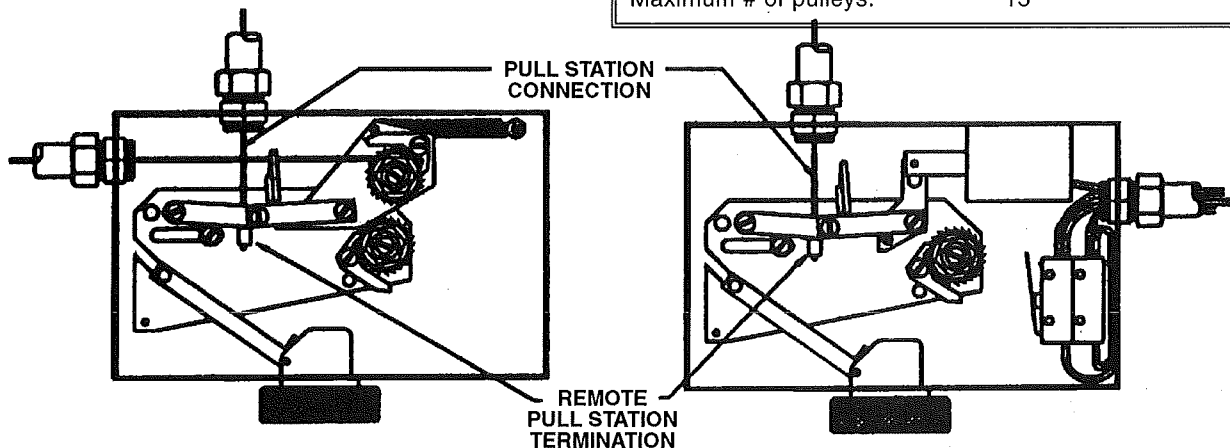


Figure 4-17. Model RPS-M Remote Pull Station.

002885PC

Chapter 4 – System Installation

Page 4-10

Rev. 1

Remove the gas valve cover and thread the stainless steel cable through the conduit back to the control head. Thread the cable through the hole in the gas valve ratchet wheel. The line must then be crimped, and the crimp positioned inside the center of the ratchet wheel.

NOTE

Crimps must always be used in conjunction with two (2) cable lengths. Loops are the accepted method of connecting the cable to mechanical components. **The crimp must never be used on a single cable.**

At the gas valve, loop the cable through the valve stem and secure it with the crimp provided (see **Figure 4-18**).

The gas valve line can now be put into a set position by applying tension to the gas valve line. This is accomplished by using a 3/4" socket on the gas valve ratchet wheel. The ratchet wheel will be ratcheted in a clockwise direction until the gas valve is fully open. Secure the gas valve cover plate to the gas valve box with the four (4) screws provided. The gas valve line is now in a set position. See **Figure 4-19**.

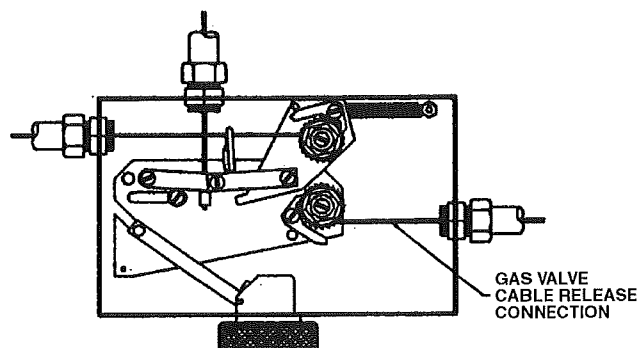


Figure 4-19. Gas Valve Line Termination.

002887PC

2. Electrical Gas Shut-Off Valve Installation.

The Model MCH/ECH Control Head is used to operate the electrical gas shut-off valve. This valve is located in the fuel gas supply line to the cooking appliance(s). The valve body has an arrow which indicates direction of gas flow through the valve. A reset relay must always be used with an electrical gas shut-off valve. For proper wiring of the electrical gas shut-off valve, see **Figure 4-15**.

TEE PULLEY INSTALLATION

The Model TP-1 Tee Pulley is used to connect two (2) mechanical gas valves or two (2) remote mechanical pull stations to a single control head. The cable proceeding from the control head must always enter the branch of the tee pulley. See **Figure 4-20**.

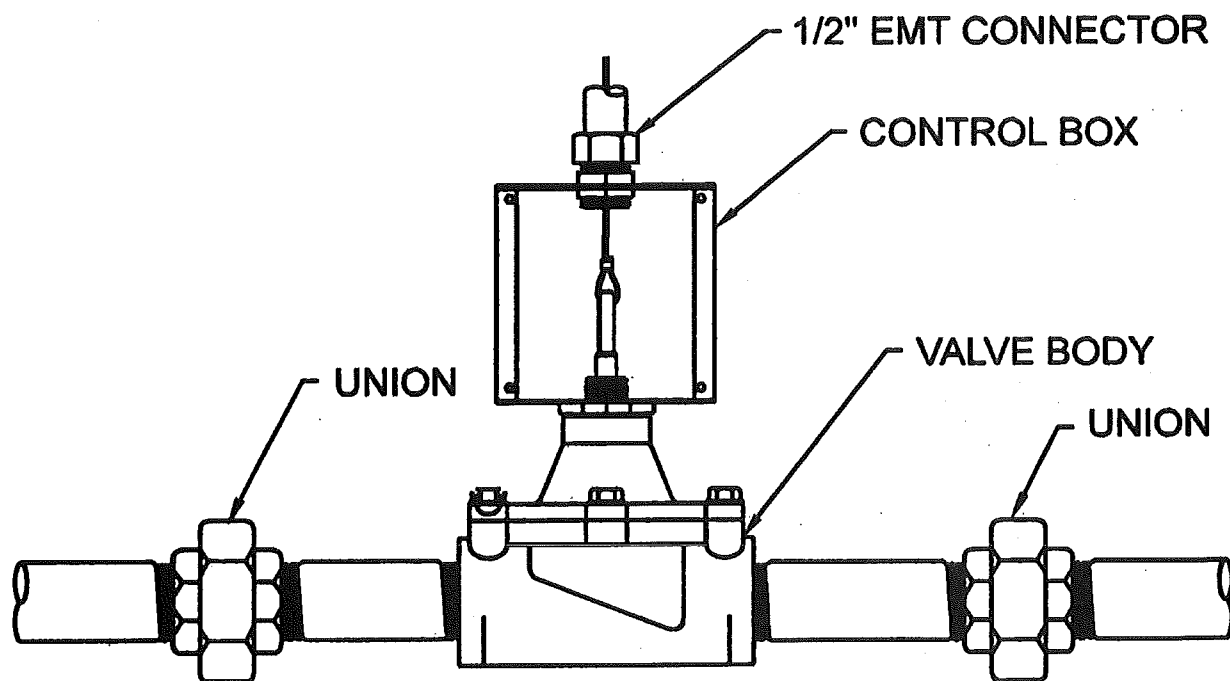


Figure 4-18. Gas Valve Installation.

002886PC

CAUTION

The tee pulley must never be used to connect multiple fusible link lines to a single control head.

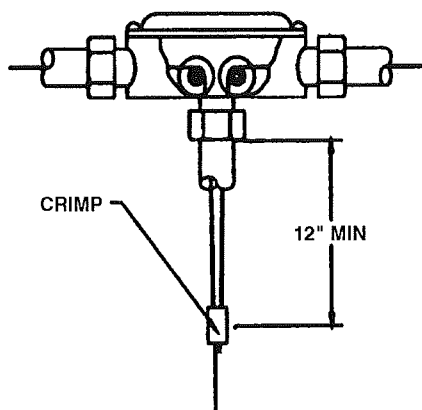


Figure 4-20. Tee Pulley Installation.

002888PC

MINIATURE SWITCH INSTALLATION

The Model MS-SPDT or MS-DPDT Miniature Switch is available for use where an electrical output is required. These switches can be field installed in the control head. See Figure 4-21 and Figure 4-22.

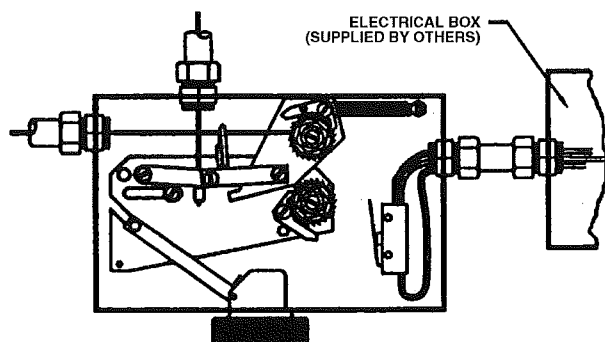


Figure 4-21. Miniature Switch Installation in Model MCH Control Head.

002889PC

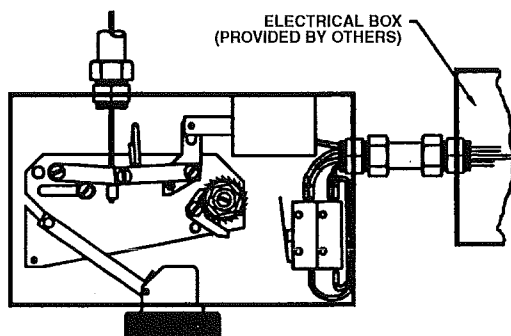


Figure 4-22. Miniature Switch Installation in Model ECH Control Head.

002890PC

NOTE

The Model ECH Control Head is supplied with a Model MS-SPDT Miniature Switch. However, this switch must be used in the actuation/detection circuit and cannot be used for electrical output. A Model MS-DPDT must be field installed in the Model ECH Control Head (replacing the MS-SPDT) if electrical output is required.

These switches may be used to provide an electrical signal to the main breaker and/or operate electrical accessories provided the rating of the switch is not exceeded. Wiring connections for the Model MS-SPDT/DPDT are shown in Figure 4-23. The contact ratings for both switches are as follows:

Contact Ratings For Miniature Switches

10 amps @ 125/250 VAC
1/2 hp @ 125VAC
1 hp @ 250VAC

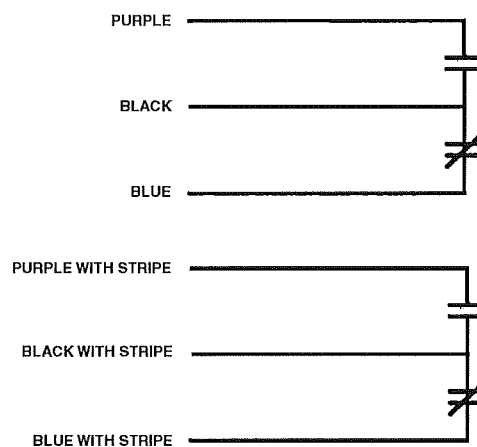


Figure 4-23. Wiring Diagram For Model MS-SPDT/DPDT Miniature Switch.

002903PC

PIPE AND NOZZLE INSTALLATION

All pipe ends shall be thoroughly reamed after cutting and all oil and foreign matter removed from the pipe. It is recommended that the following procedures be followed:

1. Periodically check the pipe threading dies to ensure that they are cutting properly.
2. Make certain that all threaded ends are reamed and the pipe is free of foreign matter and oil.
3. Apply Teflon tape on threaded ends. Start at the second male thread, wrapping the tape clockwise around the threads, away from the pipe opening.
4. Do not over-tighten, but be sure the pipe is snug. Do not back-off sections of pipe to make them fit better. If the pipe was cut too short, re-cut another pipe to the proper length.

CAUTION

Do not apply Teflon tape to cover or overlap the pipe opening, as the pipe and nozzles could become blocked and prevent the proper flow of agent.
 Do not use thread sealant or pipe joint compound.

All piping shall be securely fastened by means of pipe hangers and/or pipe straps. A union should be installed in the discharge piping, as close to the cylinder valve as possible, to permit disconnection and removal for inspection and service. Dry air or nitrogen should be blown through the discharge piping to remove chips and other debris prior to installation of nozzles.

Nozzles shall be installed in accordance with the limitations described in **Chapter III** of this manual. Blow-off caps are provided for each nozzle. These will prevent dirt and grease from clogging the nozzle.

SYSTEM CHECKOUT AFTER INSTALLATION

1. Model MCH Mechanical Control Head.

Before putting the system into service, all components must be checked for proper operation. During this checkout, assure that the carbon dioxide pilot cartridge is not installed in the control head actuator. Remove the pull pin from the hole in the slide plate.

To check satisfactory operation of the control head, cut the terminal link or the "S" hook holding the link. This will relieve all tension on the fusible link line and operate the control head. The slide plate will have moved fully to the right. The gas valve cable will have been released, causing the gas valve to close. Any auxiliary equipment connected to the dry contacts of the solenoid monitor and/or the Miniature Switch in the control head will have operated.

If any of these events fail to occur, the problem must be investigated and repaired.

Repair the terminal link and put the fusible link line back into the set position. This is accomplished by using a 5/8" socket on the fusible link line ratchet wheel. The ratchet wheel will be ratcheted in a clockwise direction until the spring plate makes contact with the top of the control head box.

Once the fusible link line is set, the control head can be placed in the set position. To set the control head, the slide plate is moved from right to left, ensuring the bolt extending from the cam arm is in the slot provided in the slide plate. Continue moving the slide plate to the left until the latching arm is in the locked position.

Once the control head is set, pull the pull handle on the remote pull station to assure that the control head operates. If the control head operates normally, the control head can be reset as described above. Insert the pull pin into the hole in the slide plate above the latching arm. Replace the pull station handle, pull pin, and nylon tie.

Assure that the gas valve is fully open by ratcheting the gas valve ratchet wheel.

CAUTION

Before screwing the carbon dioxide pilot cartridge into the actuator, ensure that the actuator has a Teflon O-ring installed.

Using a felt-tipped marker, write the date of installation in the gray area of the carbon dioxide pilot cartridge. Screw the cartridge into the control head actuator until hand-tight. Never use a wrench to tighten the cartridge into the actuator.

Remove the pull pin from the hole in the slide plate and install the control head cover. Insert the pull pin through the local manual control handle and into the bushing. Secure the pull pin with the nylon tie provided.

2. Model ECH-24/120 Electrical Control Head.

Before putting the system into service, all components must be checked for proper operation. During this checkout, assure that the carbon dioxide pilot cartridge is not installed in the control head actuator. Remove the pull pin from the hole in the slide plate.

To check satisfactory operation of the control head, apply heat to the last thermal detector in series. This will operate the control head. The slide plate will have moved fully to the right. The gas valve cable will have been released, causing the gas valve to close. The indicator light on the solenoid monitor will go out. Any auxiliary equipment connected to the dry contacts of the solenoid monitor and/or the Miniature Switch in the control head will have operated.

If any of these events fail to occur, the problem must be investigated and repaired.

Once the thermal detector has cooled, the control head can be placed in the set position. To set the control head, the slide plate is moved from right to left, ensuring the bolt extending from the cam arm is in the slot provided in the slide plate. Continue moving the slide plate to the left until the latching arm is in the locked position.

Once the control head is set, pull the pull handle on the remote pull station to assure that the control head operates. If the control head operates normally, the control head can be reset as described above. Insert the pull pin into the hole in the slide plate above the latching arm. Replace the pull station handle, pull pin, and nylon tie.

Assure that the gas valve is fully open by ratcheting the gas valve ratchet wheel.

Energize the actuation/detection circuit by depressing the push button on the solenoid monitor.

CAUTION

Before screwing the carbon dioxide pilot cartridge into the actuator, ensure that the actuator has a Teflon O-ring installed.

Using a felt-tipped marker, write the date of installation in the gray area of the carbon dioxide pilot cartridge. Screw the cartridge into the control head actuator until hand-tight. Never use a wrench to tighten the cartridge into the actuator.

Remove the pull pin from the hole in the slide plate and install the control head cover. Insert the pull pin through the local manual control handle and into the bushing. Secure the pull pin with the nylon tie provided.

Chapter 4 – System Installation
Page 4-14

NOTES:

ENCLOSURE INSTALLATION INSTRUCTIONS MODEL EN-MCU (P/N 500-420965) AND MODEL EN-S (P/N 500-420966)

MOUNTING

The Model EN-MCU and/or EN-S Enclosure must be securely anchored to the wall using bolts or lag screws. The wall to which the enclosure is attached must be sufficiently strong. The enclosure should never be fastened to dry wall or similar material. If this type of wall is encountered, studs must be located and the enclosure fastened to them.

Three (3) center mounting holes allow either enclosure to be mounted on a single stud. Four (4) corner mounting holes are also available. See **Figure 4-24**.

FUSIBLE LINK DETECTOR INSTALLATION

The Model EN-MCU Enclosure can support a fusible link detection system. The Model EN-S Enclosure cannot support a fusible link detection system and must be used in conjunction with the Model EN-MCU Enclosure or a Model MCH/ECH Control Head.

After mounting the enclosure, the fusible link line can be installed. The first step to installing the fusible link line is to install the detector brackets. These brackets must be installed in the plenum area of the ventilation hood over all protected appliances and in each duct. See **Chapter III** for detector placement guidelines. Connect the fusible link brackets together using 1/2" EMT conduit and the conduit connectors supplied in the detector kit (Model FLK-1/1A). Pyro-Chem corner pulleys must be used whenever a change in conduit direction is necessary. The conduit is connected to the enclosure through a top knockout.

See Fusible Link Detector Installation Section of this chapter (pages 4-4 - 4-6) for fusible link installation guidelines. Before attaching the stainless steel cable to the fusible link line ratchet wheel, it must be run below the fusible link line pulley in the enclosure. See **Figure 4-25**.

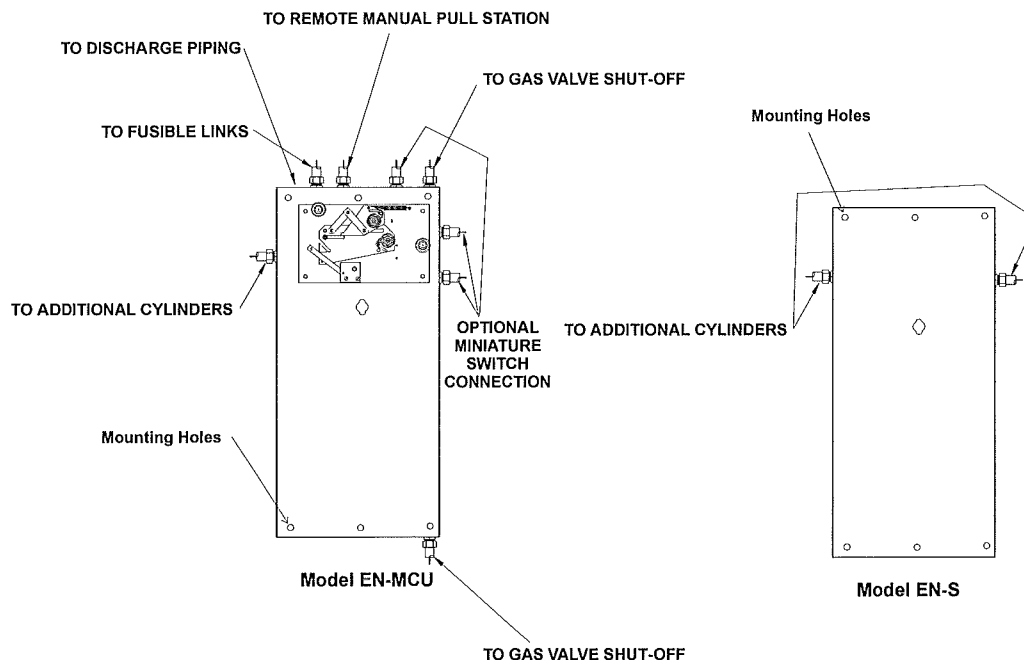


Figure 4-24. Models EN-MCU and EN-S Enclosures.

002946PC

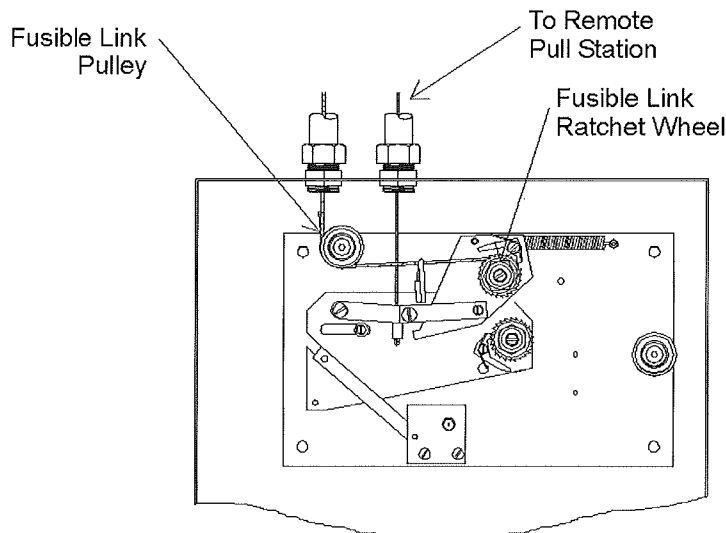


Figure 4-25. Model EN-MCU Fusible Link Line and Remote Pull Station Termination.

002947PC

SETTING THE MODEL EN-MCU

After the last link in the series is connected, the cable should be fed through the conduit back to the Model EN-MCU. It must be fed under the fusible link line pulley and through the hole in the fusible link ratchet wheel. The line must then be crimped, and the crimp positioned inside the ratchet wheel.

NOTE

Crimps must always be used in conjunction with two (2) cable lengths. Loops are the accepted method of connecting the cable to mechanical components. **The crimp must never be used on a single cable.**

Crimps must always be used in conjunction with two (2) cable lengths. Loops are the accepted method of connecting the cable to mechanical components. The crimp must never be used on a single cable.

The fusible link line can now be put into a set position by tensioning the fusible link line. This is accomplished by using a 3/4" socket on the fusible link line ratchet wheel. The ratchet wheel will be ratcheted in a clockwise direction until the spring plate is parallel to the top of the enclosure. The fusible link line is now in a set position.

Once the fusible link line is set, the Model EN-MCU Enclosure can be placed in the set position. To set the Model EN-MCU, the slide plate is moved from right to left, ensuring the bolt extending from the cam arm is in the slot provided in the slide plate. Continue moving the slide plate to the left until the latching arm is in the locked position. Insert the pull pin into the hole in the slide plate above the latching arm. This will lock the control mechanism in the set position, eliminating accidental actuation during the rest of the installation procedure. See **Figure 4-25**.

REMOTE PULL STATION INSTALLATION

The Model RPS-M Remote Mechanical Pull Station is used for remote manual actuation of the Model EN-MCU. It is to be located near an exit in the path of egress from the hazard area no more than five feet above the floor.

The Pull Station is connected to the Model EN-MCU using 3/64" or 1/16" diameter stainless steel cable. The cable enters the Model EN-MCU through a knockout in the top of the enclosure. See **Figure 4-25**.

See Remote Pull Station Installation Section of this chapter (pages 4-8/9) for remote pull station installation guidelines.

GAS SHUT-OFF VALVE INSTALLATION

The Model EN-MCU can be used to operate a mechanical gas shut-off valve. This valve is located in the fuel gas supply line to the cooking appliance(s). The valve body has an arrow which indicates direction of gas flow through the valve. The gas shut-off valve is spring loaded and requires five pounds of force to hold it open. This force is supplied by a 3/64" or 1/16" diameter stainless steel cable that is connected to the Model EN-MCU.

After the valve is installed in the gas line, 1/2" conduit must be run from the top center knockout of the gas valve box to the top or bottom knockout in the enclosure. See **Figure 4-24**. A Pyro-Chem corner pulley is used wherever a change in conduit direction is required.

Gas Valve Cable Run Limitations	
Maximum length of cable:	50 feet
Maximum # of pulleys:	15

Remove the gas valve cover and thread the stainless steel cable through the conduit back to the Model EN-MCU. If the cable enters the enclosure through the bottom knockout, the cable must be run over the gas valve line pulley (see **Figure 4-26**). If the cable enters the enclosure through the top knockout, the cable must be run under the gas valve line pulley (see **Figure 4-27**). Thread the cable through the hole in the gas valve ratchet wheel. The line must then be crimped, and the crimp positioned inside the center of the ratchet wheel.

CAUTION

The gas valve cable must always utilize the gas valve pulley and exit the top or bottom of the enclosure. **The gas valve cable cannot exit the side of the enclosure.**

At the gas valve, loop the cable through the valve stem and secure it with the crimp provided (see **Figure 4-18**, page 4-10).

The gas valve line can now be put into a set position by applying tension to the gas valve line. This is accomplished by using a 3/4" socket on the gas valve ratchet wheel. The ratchet wheel will be ratcheted in a clockwise direction until the gas valve is fully open. Secure the gas valve cover plate to the gas valve box with the four (4) screws provided. The gas valve line is now in a set position. See **Figure 4-26** and/or **Figure 4-27**.

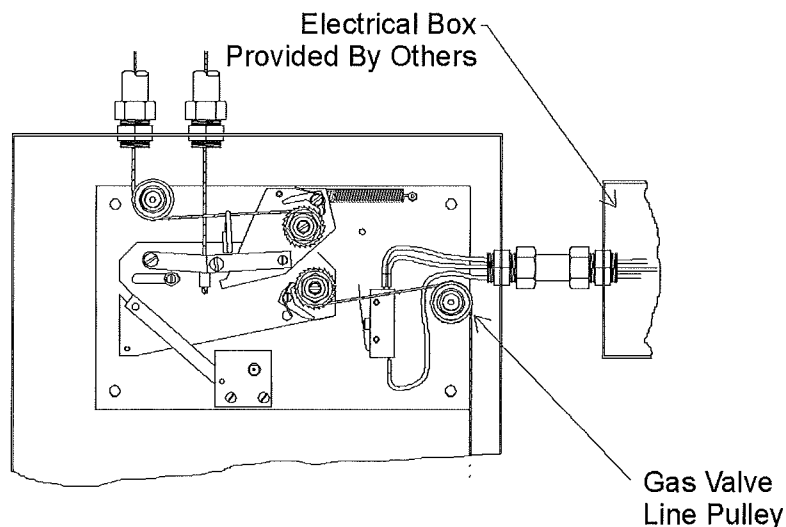


Figure 4-26. Gas Valve / Miniature Switch Installation.

002948PC

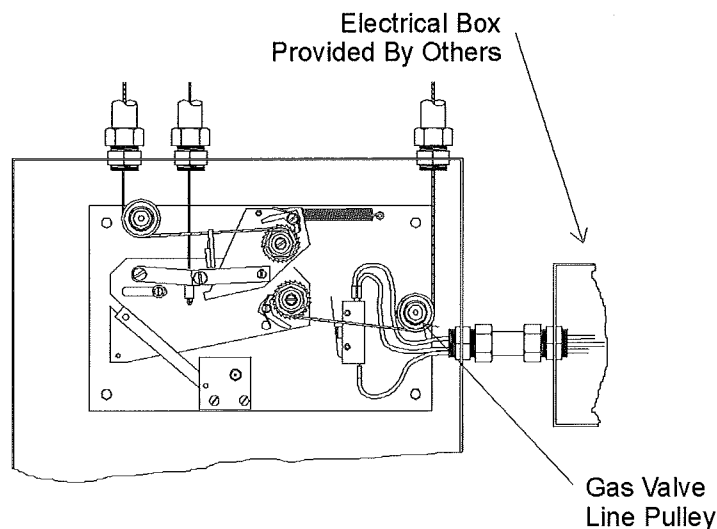


Figure 4-27. Gas Valve / Miniature Switch Installation.

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MINIATURE SWITCH INSTALLATION

The Model MS-SPDT or MS-DPDT Miniature Switch is available for use where an electrical output is required. These switches can be field installed in the Model EN-MCU. See **Figure 4-26** and/or **Figure 4-27**.

These switches may be used to provide an electrical signal to the main breaker and/or operate electrical accessories provided the rating of the switch is not exceeded. Wiring connections for the Model MS-SPDT/DPDT are shown in **Figure 4-23** (page 4-11). The contact ratings for both switches are as follows:

Contact Ratings For Miniature Switches

10 amps @ 125/250 VAC
 1/2 hp @ 125VAC
 1 hp @ 250VAC

Three (3) knockouts are provided for Miniature Switch wiring. The upper right-side knockout must be used when the gas valve line exits the bottom of the enclosure (see **Figure 4-26**). The lower right-side knockout must be used when the gas valve line exits the top of the enclosure (see **Figure 4-27**). An additional knockout located on the top of the enclosure is also provided (see **Figure 4-24**) and may be used in either situation.

CYLINDER INSTALLATION

1. Single Cylinder Installation - PCL-240/350.

The Model EN-MCU can be used for single cylinder installations. It can support either the Model PCL-240 or PCL-350 cylinder assemblies. The cylinder must be placed in the enclosure with the discharge port to the left. **No additional mounting bracket is required when the Model EN-MCU is used.**

In order to actuate the agent cylinder from the Model EN-MCU's control mechanism, pneumatic tubing must be used to connect the actuator to the valve cap assembly of the agent cylinder valve. A 1/4" NPT x 1/4", 45° flare type elbow is included and must be installed in the actuator of the Model EN-MCU Enclosure. See **Figure 4-28**.

NOTE

Pneumatic tubing used for cylinder actuation shall have an outside diameter of 1/4" with a minimum wall thickness of 1/32". This is commonly known as refrigeration-type copper tubing. All tubing fittings shall be of the 1/4", 45° flare type conforming to SAE J513c. **Compression type fittings are not acceptable.**

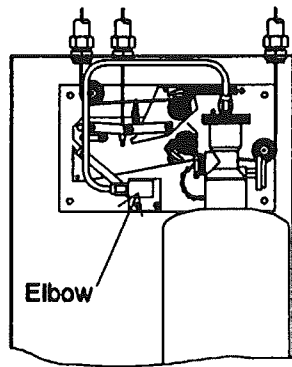


Figure 4-28. Single Cylinder Installation with Model EN-MCU Mechanical Control Unit.

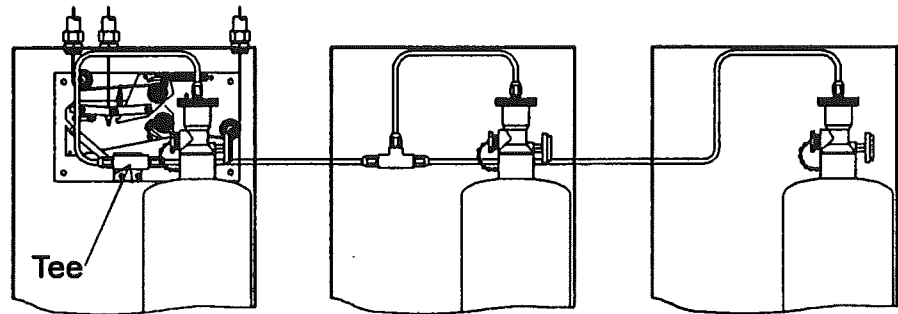


Figure 4-29. Multiple Cylinder Installation with Model EN-MCU Enclosure and Model EN-S Enclosure.

002950PC

2. Multiple Cylinder Installation - PCL-240/350.

The Model EN-S can be used in conjunction with the Model EN-MCU Enclosure or Model MCH/ECH Control Head for multiple cylinder installations. A single Model EN-MCU can be used to pneumatically actuate a maximum of three (3) agent cylinders. One (1) agent cylinder can be installed in the Model EN-MCU Enclosure; the additional agent cylinder(s) can either be mounted in a Model EN-S Enclosure or with a Model MB-15 Mounting Bracket. When an enclosure is used, the cylinders must be placed in the enclosure(s) with the discharge port to the left. **No additional mounting bracket is required when a cylinder is installed in the Model EN-MCU or EN-S Enclosure.**

In order to actuate the agent cylinders from the Model EN-MCU, pneumatic tubing must be used to connect the EN-MCU actuator to the valve cap assembly of each agent cylinder valve. Pneumatic tubing must be run from the actuator in the Model EN-MCU to the Model EN-S(s) through the side knockout. A 1/4", 45° flare x 1/4", 45° flare x 1/4" NPT tee is included with the Model EN-S and must be installed in the Model EN-MCU actuator. See **Figure 4-29**.

NOTE

Pneumatic tubing used for remote cylinder actuation shall have an outside diameter of 1/4" with a minimum wall thickness of 1/32". This is commonly known as refrigeration-type copper tubing. All tubing fittings shall be of the 1/4", 45° flare type conforming to SAE J513c. **Compression type fittings are not acceptable.**

A single Model EN-MCU can actuate a maximum of three (3) cylinders with up to 6' of copper tubing. A single Model EN-MCU can actuate a maximum of two (2) cylinders with up to 8' of copper tubing.

SYSTEM CHECKOUT AFTER INSTALLATION

Before putting the system into service, all components must be checked for proper operation. During this checkout, assure that the carbon dioxide pilot cartridge is not installed in the Model EN-MCU actuator. Remove the pull pin from the hole in the slide plate.

To check satisfactory operation of the control mechanism, cut the terminal link or the "S" hook holding the link. This will relieve all tension on the fusible link line and operate the control mechanism. The slide plate will have moved fully to the right. The gas valve cable will have been released, causing the gas valve to close. Any auxiliary equipment connected to the dry contacts of the solenoid monitor and/or the Miniature Switch in the Model EN-MCU will have operated.

If any of these events fail to occur, the problem must be investigated and repaired.

Repair the terminal link and put the fusible link line back into the set position. This is accomplished by using a 3/4" socket on the fusible link line ratchet wheel. The ratchet wheel will be ratcheted in a clockwise direction until the spring plate is parallel to the top of the enclosure.

Once the fusible link line is set, the control mechanism can be placed in the set position. To set the control mechanism, the slide plate is moved from right to left, ensuring the bolt extending from the cam arm is in the slot provided in the slide plate. Continue moving the slide plate to the left until the latching arm is in the locked position. Once the control mechanism is set, pull the pull handle on the remote pull station to assure that the control head operates. If the control mechanism operates normally, the control mechanism can be reset as described above. Insert the pull pin into the hole in the slide plate above the latching arm. Replace the pull station handle, pull pin, and nylon tie.

Assure that the gas valve is fully open by ratcheting the gas valve ratchet wheel.

CAUTION

Before screwing the carbon dioxide pilot cartridge into the actuator, ensure that the actuator has a Teflon O-ring installed.

Using a felt-tipped marker, write the date of installation in the gray area of the carbon dioxide pilot cartridge. Screw the cartridge into the Model EN-MCU actuator until hand-tight. **Never use a wrench to tighten the cartridge into the actuator.**

Remove the pull pin from the hole in the slide plate. Secure the Model EN-MCU/S cover with the screws provided.

CHAPTER V SYSTEM MAINTENANCE

GENERAL

This chapter will detail the basic information necessary for proper maintenance of the Pyro-Chem Restaurant Fire Suppression System. However, before attempting any system maintenance, it is necessary to attend a Factory Certification Training Class and become Certified to install and maintain the Pyro-Chem Restaurant Fire Suppression System. Because it is impossible to completely understand every aspect of an intricate pre-engineered system simply by reading the Technical Manual, Pyro-Chem will not be responsible for system maintenance performed by any non-Certified person(s).

MAINTENANCE AFTER SYSTEM DISCHARGE

1. System Cleanup.

The hazard area cleanup after a system discharge is very basic. The dry chemical agent reacts with grease to form a foam which can be easily cleaned up with hot, soapy water. Agent that has not combined with grease can also be cleaned up with hot, soapy water. The extinguishing agent is non-toxic; however, its alkaline nature will cause food to become inedible.

CAUTION

No cleanup should be attempted until the hazard area is cool. Water should never be used to clean hot grease.

Due to the alkaline nature of the extinguishing agent, it should not be allowed to remain on kitchen surfaces for an extended period of time. Although it will have a minimal effect on stainless steel, it could cause deterioration of non-ferrous metals like copper or aluminum.

CAUTION

This extinguishing agent is electrically conductive. All electrical equipment must be completely de-energized prior to cleanup to avoid electric shock.

2. System Recharge.

After discharge, inspect the entire system for mechanical damage. If the cylinder has sustained any mechanical damage, it must be hydrostatically tested before refilling. Disconnect the control head or pneumatic tubing from the valve cap assembly.

Relieve the pressure from the top chamber of the cylinder valve by depressing the core of the schrader valve in the valve cap assembly. By performing this operation, the valve will close and return to working status.

Verify that the cylinder has fully discharged by depressing the valve stem. This will expel any residual pressure in the cylinder. If the cylinder has residual pressure that cannot be relieved by depressing the valve stem, use the following procedure:

CAUTION

Rubber gloves and goggles must be worn during this procedure.

1. Place the anti-recoil plug in the cylinder discharge port.
2. Remove the cylinder from the system and bring it outside. Once outside, the cylinder must be fastened to a secure object.
3. Slowly remove the valve by turning it in a counterclockwise direction.
4. When the valve has been unscrewed approximately half-way, the pressure will bleed out through the pressure relief slot in the valve threads.

Remove the valve and siphon tube. After system discharge, the valve assembly must be carefully inspected to ensure no mechanical damage has occurred. If rebuilding is necessary, the Wet Valve Seal Rebuilding Kit (P/N 490-420698) should be used. It includes all system components necessary to properly rebuild the valve (see Chapter II for description).

Discard any remaining extinguishing agent in tank and refill the cylinder with wet chemical extinguishing agent. This agent is available in three size containers: 2.4 gallon (Model RL-240), 2.75 gallon (Model RL-275), and 3.5 gallon (Model RL-350). The RL-240 and RL-350 provide one complete tank charge for the PCL-240 and PCL-350 respectively. The PCL-550 requires two (2) RL-275 charges.

NOTE

The pressure gauge attached to the extinguishing system should not be used to determine when the charging pressure has been reached. A pressure regulator should be used.

Install the valve assembly and siphon tube in the cylinder hand tight. Using the Pyro-Chem Recharge Adapter Kit (P/N 500-420735), the cylinder can be re-pressurized to 175 psig @ 70° F. Invert the cylinder after pressurizing to clean any air trapped in the siphon tube. Using a soap solution, check for leaks.

3. Piping and Nozzles.

All nozzles must be removed and disassembled. The strainers and the nozzle orifices must be cleaned in warm water. Reassemble the nozzles and replace the nozzle caps.

Piping should be flushed with warm water and blown out with air or nitrogen.

After cleaning the piping, replace all nozzles in their proper location.

4. System Reset.

All fusible links should be replaced. The fusible link line can now be put into a set position by applying tension to the fusible link line. This is accomplished by using a 3/4" socket on the fusible link line ratchet wheel. The ratchet wheel will be ratcheted in a clockwise direction until the spring plate makes contact with the top of the control head box. The fusible link line is now in a set position.

After setting the fusible link line, the system can be put back into service by following the SYSTEM CHECKOUT AFTER INSTALLATION Section of **Chapter IV**.

REGULAR SYSTEM MAINTENANCE

1. Six (6) Month Maintenance.

1. Check that the hazard has not changed.
2. Check that all nylon ties are in place and the system has not been tampered with.
3. Check the entire system for mechanical damage.

NOTE

Before continuing, remove the cover from the control head and insert the pull pin in the hole in the slide plate above the latching arm. This will secure the system, preventing accidental discharge.

4. Disconnect the control head or pneumatic tubing from the valve cap assembly of each agent cylinder. Remove the carbon dioxide pilot cartridge and exercise the control head to ensure it is functioning properly. Make sure the gas shut-off valve and the remote pull station are functioning properly.

5. Inspect fusible link detectors for excessive grease buildup. Clean or replace links if necessary.

6. Reinstall the carbon dioxide pilot cartridge and replace the control head cover and nylon tie.

7. Inspect the cylinder pressure, tap the gauge lightly to ensure the needle is moving freely.

2. Annual Maintenance.

1. Inspect as per six (6) month maintenance instructions.
2. Disconnect and remove the discharge piping from the system. Using air or nitrogen, blow out the discharge piping. Replace all nozzle caps.
3. Remove the cylinder to verify fill weight.
4. Replace the carbon dioxide pilot cartridge.
5. Fixed temperature sensing elements of the fusible alloy type shall be replaced at least annually or more frequently, if necessary, to assure proper operation of the system.

4. Hydrostatic Testing.

The dry chemical agent cylinder(s) and pneumatic cylinder(s) shall be hydrostatically tested at least every twelve (12) years as per NFPA-17A.